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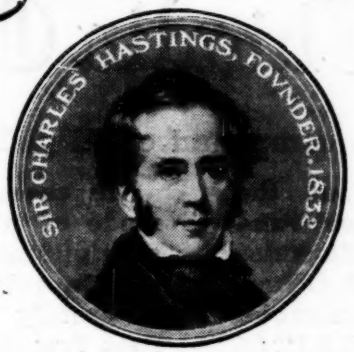

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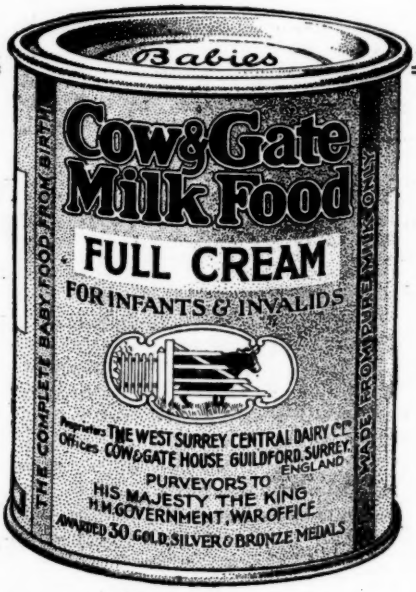
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BIOLOGY is the branch of natural science which deals with life; and the question which will be discussed in this lecture is whether we are compelled, in dealing scientifically with the phenomena of life, to make use of any fundamental conception or axiom which differentiates biology from other branches of science. I shall endeavour to show that the answer to this question must be an affirmative one if we are to bring together a coherent and progressively developing body of knowledge relating to the phenomena of life. In other words, I shall try to show that biology is, or ought to be, an independent science.

There is at present little difficulty in distinguishing practically between what we call phenomena of life and what we call inorganic phenomena. But as to the nature of the distinction, and whether it is in any real sense fundamental, there has been no agreement. I shall first glance at the opinions which have been held on this subject in modern times, and the objections to these opinions.

The Mechanistic Theory of Life.

In the writings of Descartes, and particularly in his *De Homine* and *De Formatione Foetus*, we first find quite clearly expressed the doctrine that a living body is simply a piece of physical and chemical mechanism, produced by a mechanical process of development. He describes in detail, and with great clearness, the manner in which he believed that the machinery of a living animal works or may work, and the mechanical process by which this machinery is, or may be, formed in the embryo. Although it soon appeared that most of his details were entirely wrong, his belief that physiological processes are in ultimate analysis nothing but what may, broadly speaking, be called mechanical processes has survived, and at present represents the opinion which is generally regarded as orthodox in biology. Not only biologists, but also the general public, speak of the mechanism of the living body and of all the processes occurring in it. They even regard it as self-evident that, apart from conscious action, everything occurring in a living organism is mechanically determined. I cannot, therefore, pretend that my own conclusions on this subject are other than heretical for the present.

Descartes himself was no materialist. For him the soul was independent of the body; but as to how body and soul interact his account is far from clear, and on this point his successors took divergent views. It is interesting to remark that the extremest mechanistic theories of life have often been combined with the most orthodox theological opinions as to body and soul. To realize this we have only to glance through Paley's *Evidences*, or to remember that Theodore Schwann, though he was a leader of the modern mechanistic school in physiology, was also a devout and orthodox Catholic.

Animists and Vitalists.

The mechanistic conception of life, as put forward by Descartes, was only accepted by a minority of the biologists of his time, and was specially attacked by Stahl, the author of the phlogiston theory in chemistry. Stahl was so impressed by the apparent purposive character of physiological processes that he concluded that the soul acts directly at all parts of the body, though we may not be conscious of this action. For him, therefore, life was a process guided by the soul, and distinguished from inorganic processes by this fact. Stahl's teaching is known as animism, and the best known avowed modern representative of animism is Professor McDougall, whose well known book, *Body and Mind*, is a defence of this doctrine.

The majority of biologists in the eighteenth and first half of the nineteenth centuries followed neither Descartes nor Stahl, but took what may be described as a middle course. Since there is no consciousness of apparently purposive phenomena such as assimilation, growth, and reproduction, these were attributed to an influence called the vital principle or vital force, which was conceived as something midway in character between the conscious soul and mechanism, and involved no such strained theory as that plants possess souls. On the other hand, mechanical explanation was adopted in all cases where it seemed capable of adoption. The boundary line between the action of vital force and mere mechanism was a shadowy one; but this dualistic system of explanation held its ground for long. The great comparative anatomist and physiologist Johannes Müller may be regarded as a typical representative of it as it existed last century. Liebig and Wöhler were other well known representatives.

The Neo-Mechanists of Last Century.

About the middle of last century the younger physiologists became altogether dissatisfied with the conception of vital force, and at the same time believed that they were finding a way towards dispensing with it altogether. Schwann, for instance, after discovering what is now familiar to us as the cellular composition of the bodies of higher animals, believed that he had also discovered that cell formation is only a form of precipitation. Mayer applied his new conceptions of energy to the living body, and pointed out that oxidation of food material is the source of the energy of muscular contraction. On all hands the younger biologists put forward mechanical theories of what had hitherto been attributed to the influence of vital force. The conception itself of vital force was also vigorously attacked, and the attack was a deadly one—not one whit the less so though most of the new mechanistic explanations of that time turned out to be wrong, like Schwann's theory of cell formation.

It was pointed out by the neo-mechanists that all manifestations of life are found to depend on physical and chemical conditions in the environment. There is thus no evidence whatever for the existence of an influence which is independent of physical and chemical conditions, as the vital force was assumed to be. All vital phenomena are dependent on such factors as the presence of oxygen, water, various mineral constituents, warmth or light, and suitable stimuli of various kinds. The more closely we investigate, the more certainly does this appear; and for this reason biologists will never go back to vitalism or animism.

It is true that there are still professed vitalists, among whom the best known is Driesch. He bases his vitalism especially on some of the facts revealed by experimental embryology, and particularly on his discovery that when the cells of an early developing embryo are separated from one another complete embryos may nevertheless be developed from each of the separated cells. A guiding influence seems, therefore, to be present in each cell, independently of the arrangement and amount of the material which was present in the original ovum. This guiding influence appears to cause each cell to behave in such a way as to contribute towards forming a complete embryo in spite of such confusion as is produced by artificially separating the cells. In reality, however, there is nothing to show that the behaviour of each cell is not a response to influences in its environment. When the cells are separated these influences must be changed. When they are left together each cell will influence its neighbour cells, stimulating or inhibiting their development in different directions, with the result that the embryo as a whole develops in the usual way. In the behaviour of the cells in a developing embryo there is therefore nothing fundamentally different from the responses to stimuli which we observe in any living structure. We can investigate these stimuli and the corresponding responses; and when our method is delicate enough we can always discover their connexion. Biology has no use for the vitalistic assumption of an internal guiding influence which is independent of the influence of external conditions. Such an assumption is only an artificial hindrance to investigation, and amounts to an attempt to strangle it.

Failure of the Neo-Mechanists.

In so far as the mechanistic movement which culminated about the middle of last century was a casting out of vitalism from biology I do not think there is anything further to be said. Nevertheless it seems to me that the coincident attempt to establish biology on a mechanistic basis has been a gigantic failure. It is one thing to conclude that the structure and activity of any living organism or part of it is dependent on its environment, but quite another thing to draw the additional conclusion that life must be a mechanical process, and can be investigated successfully on this assumption.

The usefulness within certain limits of mechanical explanations in physiology is, of course, evident, and was equally evident to the vitalists with their dualistic system of explanation. If we skim over the surface of physiology we can represent the life of any organism as if it were a series of mechanical processes such as the working of joints, the ingestion of oxygen into the lungs and blood, or of food material into the alimentary canal and blood, or the formation of images on the retina. Taken separately, each of these mechanical representations is in more or less close accordance with experience, and is correspondingly useful. Nevertheless it was the failure of attempts to extend mechanical conceptions to the phenomena of unconscious life as a whole that gave rise to vitalism; and it is quite evident now that the physiologists of the middle and later parts of last century were altogether mistaken in supposing that they were getting over this failure. The mere abolition of vitalism has in reality left physiology as an incoherent collection of details, with not even the very unsatisfactory vitalistic theory to produce some appearance of unity. The mechanistic cement which seemed so promising fifty or sixty years ago has crumbled away.

To understand this situation it is absolutely necessary to consider closely the characteristic phenomena of life. The outstanding feature which distinguishes what we call the phenomena of life from what we call inorganic phenomena is that in the case of life the form, size, properties, composition, and activity of each part of an organism and its immediate environment depend, broadly speaking, on its relations to the other parts, and that the relationship is actively maintained or reproduced in successive generations. Life is continuous from generation to generation, as was finally shown by Pasteur's famous investigations.

Internal Environment.

The specific character of each variety of organism and its mode of life have been thoroughly realized ever since animals and plants began to be classified. What has not been realized, however, is that not only are the form and activities of organic structure specific, but also its immediate environment. This feature of life is emphasized in my recently published book *Respiration*; but I wish to place before you in a broader manner the facts relating to immediate environment.

Pasteur's great contemporary, Claude Bernard, was the first to recognize the fact that in the higher organisms the living tissue elements live in an internal environment of a specific character, which is kept relatively constant by the combined activities of the various parts of the body. My own experimental work as a physiologist has been mainly in the development and extension of this conclusion. The tissue elements, for instance, are in relation with the external air through the process of respiration. If, now, we examine this relation we find that the concentration of carbon dioxide and oxygen in the air contained in the alveoli or air cells of the lung remains extraordinarily constant, particularly as regards the percentage of carbon dioxide. This is brought about by regulation of the breathing in accordance with the very variable amounts of carbon dioxide formed in the muscles or elsewhere and carried by the blood to the lungs, or else present in the outside air. Hence the concentration of carbon dioxide in the arterial blood is kept extremely steady, and the delicacy of this regulation is extraordinary. Carbon dioxide when in solution acts as a weak acid, and further investigation showed that what is regulated is not the mere amount of carbon dioxide in the blood, but its reaction or hydrogen ion concentration. This regulation of reaction is so delicate that not even the most sensitive of the available methods of measurement can follow it exactly.

The regulation of the oxygen concentration in the alveolar air is not nearly so delicate; but if we consider, not merely this oxygen concentration, but the percentage saturation with oxygen of the haemoglobin in the arterial blood, we find an almost equal delicacy of regulation. We have also every reason to believe that if we considered the reaction and partial pressure of oxygen, not merely in the arterial blood, but in the liquid bathing the tissue elements in the central nervous system, we should find a still greater accuracy of regulation, since the rate of blood flow is, in general, regulated in such a manner as to keep the reaction and oxygen pressure steady in spite of great local variation in consumption of oxygen and formation of carbon dioxide.

Let us now pass to the physiology of the kidneys. In this part of physiology recent advances have been almost as striking as in connexion with respiration. Within the last few years it has become increasingly evident that renal excretion regulates the composition of the blood with a delicacy even greater than that connected with intake and output of gases by the lungs. To the smallest excess or deficiency of water or of chloride in the blood the kidneys react by greater or less excretion of water or chloride. To the minutest excess or deficiency in alkalinity they react similarly with a far greater excretion of alkali or acid. To excess in the percentage of sugar in the blood they react by excreting an enormously greater percentage of sugar in the urine. To minute percentages of urea and numerous other substances they react by concentrating them into the urine. By this selective action they keep the composition of the blood normal in a number of different respects and thus keep the specific internal environment steady.

When we look to what is known of other organs or parts of the body we find similar regulative activity. The influence of the liver in regulating the percentage of sugar in the blood was discovered by Claude Bernard himself, and every year adds to our knowledge of the regulative action of different organs and tissues. Perhaps the simplest case is that of the fat-storing tissues so widely distributed in animals and plants.

I have said enough to show that in higher organisms the maintenance of the immediate environment is just as striking a phenomenon as the maintenance of what we regard as the actually living structure. Is there any real difference in this respect, except in degree, between higher and lower organisms? I do not for a moment believe that there is, although in the case of lower organisms, and particularly unicellular organisms, it is difficult to obtain the clear evidence that we can easily obtain from the study of higher organisms, and particularly from the physiological study of man. In the case of unicellular organisms, or single cells of any kind, we are apt to assume that what has been called by the convenient but very misleading term "protoplasm" represents living structure, while anything outside the delicate cell wall represents environment. But all the probabilities are against this view. We have every reason to believe that within living cells the specific structural elements have an internal environment similar in function to the definitely known internal environment of higher compound organisms. There seems, for instance, to be little doubt that the contractile vacuoles present in fresh-water unicellular organisms are constantly engaged in excreting and pumping out the excess of water which leaks in through the semi-permeable cell wall in virtue of the higher "osmotic pressure" in the internal medium. The vacuoles are thus constantly performing the same function as the kidneys during the excretion of any excess of water that has been taken into the internal medium of a mammal.

Internal Nervous Environment.

It may appear at first sight as if the central nervous system is directly exposed through the sensory nerves to the full brunt of physical changes in the external environment, without the intervention of anything corresponding to an internal environment. In the case of any particular kind of sensory excitation we have, however, an automatic physiological raising or lowering of the threshold of excitation in accordance with the total strength of stimulus. This fact appears as the well known law of sensory excitation formulated by Weber. A light-stimulus which produces marked light-excitation with a dim general illumination may produce no excitation at all with a less dim general illumination. For instance, the light-stimulus of a bright star, which produces no excitation at all in even fading daylight, has a marked excitatory effect in the far dimmer illumination of night. Within very wide limits the unit of light-stimulus required to produce excitation varies with the general illumination of the visual field, so that the general excitation remains constant. Moreover, if all light-stimulus is cut off there is still general excitation of the visual field. In perfect darkness an illuminated field of subjective vision still remains.

We can thus compare the general constancy of the field of sensory excitation with the general constancy of the internal environment. In different parts of the circulatory system and round different cells there are very distinct differences in the internal environment, just as there are very distinct differences in different parts of the visual field. But these differences are extremely small in comparison with differences in the external environment, since they are controlled physiologically.

It is the physiological activities of the living tissue elements that regulate the internal environment and the fields of

sensory excitation. On the other hand, however, the evidence is no less clear that not only the normal activity of the living tissues, but also their normal structural maintenance, depends on the maintenance of the internal environment. For instance, not merely abnormal function, or cessation of function, results from imperfect regulative action of the lungs or kidneys, but also grave changes in structure. Analysis of the symptoms met with in disease of different organs, or in connexion with such great abnormalities of external environment that the compensatory resources of the body are overpowered, is constantly teaching this lesson in different directions. The question whether living structure determines environment, or environment determines living structure, is thus not one that can be answered. If we say that they act mutually on one another this is no answer: for apart from their active relationship they cease to exist except in the totally changed form of dead or dying material. Both living structure and internal environment are expressions of molecular and ionic flux. If the flux is interfered with both structure and environment are rapidly changed. Living structure and its immediate environment are not things which can be separated from one another like lifeless things which we regard as mutually acting on one another. In other words, the conception itself of mutual interaction is not applicable.

Organisms will continue to live in very different external environments; but this is only because they are still capable of maintaining their internal environment. The higher organisms are capable of doing this to a very marked extent, and this is one of their distinguishing characters.

Structure, Environment, and Activity.

The environments of the individual cells in any tissue or organ are not merely a general internal environment common to all the cells, but special environments dependent on the influence of neighbouring cells, and even of cells in distant organs, such as ductless glands or sexual organs. The effects of interference with either these special environments, or the general internal environment, are seen in the cell changes studied by pathological anatomists. It is on the special environments which establish themselves round individual cells that the specific structures of organs and tissues must ultimately depend. But on the other hand these specific environments depend on the activities of the cells themselves, just as does the general internal environment. Here again structure depends on environment and environment on structure; and if we attempt to separate living structure from its active environment we simply fail. Form, composition, activity, and environment are inseparably bound up together. They only exist relatively to one another. In biology relativity is no far-off principle behind ordinary observation. It confronts us at every turn when we attempt to express life as a mechanical process of interaction between organic structure and environment, or between cell and cell.

This relativity is the rock on which all past attempts to frame a mechanistic conception of life have foundered, and on which all future attempts will certainly founder. The gross external changes in which life manifests itself can be expressed in physical and chemical terms. But when we endeavour to express in similar terms the processes by which these changes are actuated and regulated we are everywhere baffled by an indefiniteness and complexity due to the fact that each phenomenon, whether of apparent structure or apparent activity, is relative to other phenomena. Instead of definite structural machinery such as Descartes or the neo-mechanists of last century imagined, we seem to find only that unstable and physically indefinite something which we call protoplasm.

If we nevertheless assume that definite though invisible structural machinery exists in all living cells and explains mechanically all the delicate and intensely specific reactions which we discover in living cells, we are at once faced by an insuperable difficulty. All of this assumed structural machinery must have developed in the development of the organism, and must have originated from a very minute part of the structural machinery of the parent organism or organisms. We are thus compelled to assume that in each germ of a future organism there is machinery for the building up of the machinery of the future adult organism, and the building up of this reproductive machinery itself has then to be accounted for, and of the machinery which built it up in previous generations *ad infinitum*.

The mechanistic theory of life involves us, therefore, in meaningless absurdities. It is evident also that even where we can, as in the case, say, of the working of a joint, lay our hands on a piece of what seems to be definite anatomical machinery, we are equally involved in meaningless absurdities if we attempt to account on mechanistic principles for the reproduction of the joint in successive generations. If, moreover, we try to account on mechanistic principles for the physiological maintenance of the anatomical machinery, we are again faced by the relativity of the phenomena we are dealing with. The more we discover of apparent mechanism in a living organism, and the more delicate and complex this mechanism is, the more hopeless are the problems which face a mechanistic theory of life in connexion with the phenomena of maintenance and reproduction. The discovery of what we call mechanisms in connexion with the phenomena of life is never any advance towards a mechanistic conception of life, since the more of such apparent mechanisms we discover the more completely unintelligible from a mechanistic standpoint does their maintenance and reproduction appear.

To me it seems perfectly evident that not only the vitalistic, but also the mechanistic conception of life is totally unsatisfactory. The mechanists pointed out clearly the impossibility of vitalism, but they failed to see, at the same time, that their own conception of life was equally impossible. With either a vitalistic or a mechanistic conception biology is nothing but chaos. The mechanists are in reality always being driven back on vitalistic ideas to help out their mechanistic conception, just as the vitalists were always using mechanistic ideas to help out their vitalism. But this compromise only conceals, and in reality does nothing to obviate, the chaotic position on either conception. I have tried to analyse the reasons for this unsatisfactory position, and I shall now try to point out what seems to me the only way of escape from it.

Relativity and Persistent Wholeness in the Phenomena of Life.

As was so clearly pointed out in the opening lecture of this series by Professor Whitehead, the present generation has been witnessing a definite break-up in the fundamental mathematical and physical conceptions which we have inherited through Euclid, Galileo, and Newton. We can, however, still use the Euclidean, Galilean, and Newtonian working hypotheses for nearly all practical purposes in connexion with the mathematical and physical sciences, though their ultimate authority has disappeared. In connexion with the phenomena of life, however, we are everywhere in practical contact with the relativity to one another of the phenomena we are studying, as I have already pointed out. It seems to me, therefore, that in biology it is necessary to abandon, even for ordinary practical purposes, the Galilean or mechanistic conception of phenomena, and frankly embody the principle of relativity in our fundamental working conception. When we take this step we must take care, however, not straightway to introduce confusion by returning in part to the Galilean mechanistic conceptions which Descartes attempted to apply in biology. We must, in other words, treat the phenomena of life entirely from the biological standpoint, and not from that of the Galilean physics.

From the biological standpoint organism and biological environment, structure and activity of structure, parts and other parts, are not things separable in thought from one another, but existing only in their relations. If we attempt to separate them from one another they become from the biological standpoint just as meaningless as is motion or passage of time in an empty universe. Completely separated structural elements are, or at least seem to be, no longer alive, and have thus passed out of the ken of biology, where biologists can meanwhile leave them to the discussions between the new and the old physicists.

When we have admitted that the phenomena of life must be regarded as existing relatively to one another we have only taken a first step in defining a satisfactory conception of life. We have to take into consideration the further fact that life is persistent and continuous from generation to generation. The life of any species of organism is no mere fleeting appearance, but persists in all its essential characteristics. This persistence is also prominent in the life of the individual organism, and the parts of biology which we ordinarily call physiology and anatomy are based on the fact of this persistence. The structure, activities, and internal environment of the individual organism persist, and but for this a scientific treatment of anatomy and physiology would

be impossible. It is not merely relativity, but a definite and enduring order showing itself in the related phenomena, that biology deals with.

At this point I wish to emphasize once more the fact that biology does not begin with living structure, but includes environment. Moreover, there is no sharp distinction between an internal environment under organic control and the external environment. We see this clearly in the case of the air in the lung alveoli; and the same thing is also more or less clear in the case of the contents of the intestine or the temperature of the skin. Each organism, moreover, has its own special "habitat," and either by movements or in various other ways the influence on it of its environment is controlled biologically. It is a difference in the point of view from which we are compelled to regard biological phenomena, and not any spatial boundary, that separates them from what we distinguish as inorganic phenomena. The environment is not something outside of life and acting on it from without. Nor is life something localized within the living structure of an organism. Life is an organic whole without spatial boundaries, and hence cannot be localized definitely. What we *can* localize in relation to one another are only its manifestations, such as special organic structures or aspects of living activity. There is no more warrant for localizing life within the structure of an organism than for localizing consciousness in the brain.

If we attempt to resolve the life of an organism into a number of separate processes we reach no intelligible result. Nature laughs at us, just as she laughed at Michelson and Morley when they innocently attempted to measure the absolute velocity at which our planet is travelling. If, for instance, we continue to ask by what special pieces of machinery the kidneys or respiratory centre regulate the composition of the blood Nature will continue to mock us until we understand that such questions are meaningless. But if we ask her the sort of questions about the details of renal or respiratory regulation that scientific biology can put she answers us fully. These questions must be asked from the standpoint of the life of the body as a whole, as it is only from this standpoint that an answer can be looked for.

Since the time of the mechanistic movement in biology last century it has been generally taken for granted by physiologists that in the investigation of life all considerations of a so-called teleological character must be left out of account; and this assumption has in every direction fettered and misled investigators. The life of any organism persists as a whole. Both the persistence and the wholeness are just parts of the essential nature of life; and biology seeks out the details of structure and activity in which both the persistence and the wholeness of life manifest themselves. To the mechanistic biologists the appearance of wholeness in the life of an organism seemed to be only superficial. They allowed themselves to be overwhelmed intellectually by the Galilean ideas of the physical sciences; and this diverted them from the proper lines of biological investigation into vain quests for imaginary mechanisms.

The wholeness in the phenomena of life is not merely externally imposed, as in the case of a machine; and if we neglect the inherent element of wholeness we are also neglecting life itself. To bring into clear relief the elements of wholeness and persistence we have only to disturb in various directions the ordinary working or structure of the body. It will then be seen that the normal state soon asserts itself. The organism adapts itself to the new conditions; and life is in reality a constant process of adaptation to varying conditions of external environment. By studying the responses of renal excretion, of respiration, of circulation, of blood composition, of the nervous system, and of every other organ and tissue in the body, to changes in environment, we can discover how each organ or tissue plays its part in life as a whole; but if we leave out of account life as a whole because this consideration savours of teleology, we reach nothing but an unintelligible jumble of unconnected observations. On this point I most emphatically mean what I say.

The Relations of Organisms to One Another.

In the relations of organisms to one another, no less than in the relations of organism to environment, the wholeness of life is apparent. When Schleiden and Schwann discovered that all the higher organisms are compound it seemed at first as if the life of a compound organism could be resolved into the sum of the lives of the constituent cells. It is very evident now, however, that this would be a very misleading conclusion. The behaviour and structure of individual cells is very different according as they are normally related to one another as in a compound organism or isolated as in a tissue culture. The behaviour of each cell in the compound organism depends on its specific environment there, which depends in turn on relations to the other cells and their environments. But, as already seen, we cannot, either in deed or thought, separate living structure from its environment. We cannot add up in a sum units which do not exist separately. Hence the life of a compound organism is no mere sum of the lives of its constituent cells.

When we consider the lives of separate organisms, whether compound or unicellular, similar considerations come in. The individuals of a species live and die in biological relation to the lives of one another and of members of other species, just as do the cells in a compound organism.

In accordance with the reasoning which has just been set before you physiology deals essentially, not with illusory quests after the mechanisms of different bodily activities, but with the particular manner in which each structural element plays its part in the life of the organism as a whole. To take an example: it is, and always has been, a vain quest to discover the mechanism of secretion by the kidneys. We can trace the complete failure of such attempts from the time of Descartes onwards through Ludwig and others to the present day. But our physiological knowledge of what the kidneys are actually doing in relation to the maintenance of the life of the body as a whole has steadily grown, and perhaps never so rapidly as during the last few years. It is the same with regard to respiration, circulation, nervous activity, and all other bodily activities. If we try to understand them from the point of view of ordinary physics and chemistry they appear as a chaotic tangle, becoming more chaotic with every advance in detailed knowledge; but from the distinctively biological standpoint which I have tried to present our knowledge of them is both coherent and steadily progressive.

The Future of Anatomy.

According to the conception which was popularized in the latter part of last century anatomy deals with the structural mechanism of organisms, and physiology with its working. This conception harmonized with the popular Galilean conceptions of the universe, and therefore appealed to what one may call "the masses," but left anatomy high and dry as soon as it became evident that with neither the scalpel nor microscope as applied to dead organisms could structure be found that was capable of throwing light on any fundamental physiological activity. The physiologists got the living organisms, and with them the living parts of biological science. In reality there ought to be no separation between anatomy and physiology except as regards technical methods of investigation. They both deal with the manifestations of life as such. Whether, in the investigation of life, use is made of the scalpel or microscope, or of other physical apparatus, or of chemical methods of different kinds, it is life that a biologist is investigating; and those who allow life to be banished from their mental vision by the nature of the technical methods they employ have no claim to be regarded as biologists. The details which their several methods reveal must be interpreted biologically or else remain outside the scope of biology as a science. The future anatomy will certainly be an experimental science, and will investigate structure as relative to environment and activity.

Conclusions.

The outcome of this discussion is that biology and the physical sciences are distinct from one another, not because they deal with spatially distinct parts of our world, but because they employ different working conceptions or axioms in interpreting their data. Relativity and persistence of a definite order in the related phenomena are of the essence of the conception of life, while they do not enter into the Galilean conception of the physical universe. Behind this Galilean conception, however, something strangely akin to the biological conception is now beginning to loom up. In addition to the conclusions of Einstein, the new conceptions, evolved by Rutherford and Nils Bohr, of what an atom is, seem to be bringing the physicists into touch with biological conceptions. In any case biology will never rest until biological conceptions have been extended to what is at present interpreted as the inorganic world. The well-meant attempt of the last generations of biologists to treat life as mechanism—in other words, to apply Galilean conceptions to life—has not only been an actual failure, but, if the reasoning

I have placed before you is correct, could not possibly be anything but a failure. In other words, the Galilean conception of the universe, since it cannot represent life, cannot possibly represent reality itself, but is only a preliminary and definitely insufficient working hypothesis with regard to reality. This universe is no disorderly spectacle of independent and self-existent things scattered about indiscriminately in infinite space and time. The facts of biology, even taken by themselves, render any such hypothesis impossible.

I chose the subject of this lecture because it seemed to me of the greatest importance at the present time that we should begin to realize more clearly that what we perceive is a matter of interpretation, and depends upon the axioms or working hypotheses which we adopt as consistent with our observations. In the distinction between biology and the physical sciences this fact comes definitely before us. Biological interpretation occupies a position midway between the Galilean interpretation and humanistic or spiritual interpretations. From the thorough-going Galilean standpoint of materialism the spiritual interpretation is mere illusion, and biology as a science independent of the physical sciences is non-existent. But the time has now come for examination of our axioms and a strict inquiry as to how far they are valid and consistent with experience.

In the course of this examination the spiritual interpretation as the supreme interpretation of our universe is coming again to its own, and a fundamental step seems to me to be the inquiry into the difference between the axioms of biology and those of the physical sciences. Had it been the case that the Galilean conceptions of the physical sciences applied to the phenomena of life the difficulties of a spiritual interpretation of our ordinary experience would have been very great. Biological interpretation provides us with a bridge towards psychological or spiritual interpretation.

Biology does not attempt to deal with distinctively psychological phenomena, although in connexion with the physiology of the nervous system it quite legitimately utilizes conscious responses as a mere index of physiological responses, while not attempting to take into account the distinctive characters of conscious responses as such. Hence biology is distinct from psychology. On the other hand, as I have tried to show, the attempts to extend mechanistic conceptions to life have only resulted in proving definitely that the phenomena of life must be interpreted in terms of the distinctive conception of life. For these reasons biology must be regarded as an independent science; and this is the thesis which I set out to establish.

THE LATE RESULTS OF MENINGEAL HAEMORRHAGE OF THE NEWLY BORN.

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OF cases which present themselves in later childhood as examples of infantile cerebral diplegia or paraplegia, dating from birth, what proportion owe their origin to meningeal haemorrhage occurring during or shortly after the moment of birth? It is a question which has often been asked and to which very different answers have been given. Sixty years ago Little,[1] the orthopaedic surgeon, had made up his mind that the majority of the children brought to him with spastic paralysis owed their unfortunate condition to accidents occurring at birth. So impressed was he with the truth and importance of this discovery that, introduced as a guest, he attended a meeting of the Obstetric Society of London and read a paper, thereafter famous, in which he invited the co-operation of his obstetric friends in investigating the origin of these disturbances, with the later results of which he was familiar and which he described graphically and with singular completeness.

The response to his appeal was apparently somewhat disappointing. The discussion which followed was meagre and barren. The distinguished obstetricians present had no knowledge of these unfortunate results of their ministrations. It was not until the year 1885 that a definite investigation was undertaken by Sarah MacNutt.[2] In ten infants dying at birth or soon after birth, with symptoms of asphyxia, stupor, paralysis, rigidity, and convulsions, she demonstrated the presence of extensive meningeal haemorrhage below or above the tentorium cerebelli or in both situations. Gowers[3] unhesitatingly accepted the views of Little and MacNutt as in accord with his own extensive experience and describes cases with symptoms similar to those of Little under the name "infantile meningeal haemorrhage." Of MacNutt's work he is reported as saying, "It is by far the most valuable contribution to medical science that the profession has yet received from members of her sex."

In 1889 Osler[4] published his book *The Cerebral Palsies of Children*. He adopts and adduces evidence in favour of the views of Little and Gowers.

> "Facts have gradually been accumulated to show that haemorrhage, usually meningeal, is a very frequent condition in children dying shortly after birth of asphyxia or convulsions, and as the birth palsies almost invariably have this history it seems reasonable to conclude that, in the cases which recover and subsequently present signs of motor disturbance, a similar, though less intense, lesion has existed."

In the last few years investigations into the causes of stillbirth have been carried out by numerous workers. In 167 cases examined Holland[5] found tears of the tentorium in 81 (48 per cent.), and all of these except 6 were accompanied by subdural haemorrhage. There is general agreement that meningeal haemorrhage is by far the most common cause of death in fresh non-macerated foetuses and in infants dying shortly after the conclusion of labour. It is impossible not to conclude, with Osler, that many, and perhaps the larger number, escape with their lives, but suffer permanent damage in varying degree.

There are, however, difficulties in the way of unqualified acceptance of the view that in the numerous cases of cerebral diplegia which present themselves later in life we are encountering the aftermath of this damage at the moment of birth. The interval between the birth and the time when the crippled child is first brought for advice is often long, and it is not always possible to rely upon the mother's memory of the details of labour, if, indeed, these have ever been told her. Moreover, when after this long interval opportunity presents itself for making a *post-mortem* examination, the scarred and atrophied brain shows no evidence of the nature of the original lesion which occurred so long ago, and which has been so long extinct.

Apart from meningeal haemorrhage, two other views have been held of the origin of cerebral diplegia dating from birth. There are those who regard the majority of cases as due to infective meningo-encephalitis, intra-natal or neo-natal. Virchow[6] speaks of "encephalitis interstitialis congenita," Henoch[7] of "haemorrhagic encephalitis." If we accept this view we must conclude that in general the infants recover, since routine investigations upon infants dying soon after birth show little evidence of encephalitis, but abundant evidence of haemorrhage. Cases which have come under our own notice suggest that trauma and haemorrhage themselves predispose to encephalitis. Probably the organization of the clot is always accompanied by a varying inflammatory reaction. The following is a good example of suppuration supervening upon haemorrhage. In this case there could be no doubt about the existence of the haemorrhage, because in addition to meningeal exudation there was a large clot within the substance of the brain.

> An infant born at full time, in St. James's Hospital, Balham, with a breech presentation, after a difficult labour, was to some extent asphyxiated. Seen on the sixth day of life the fontanelle was tense and bulging, the pupils were unequal, and the limbs stiff and rigid. There had been repeated convulsions. On the sixth day the temperature rose to 104° F., and continued high. Death took place on the tenth day. At the autopsy the surface of the brain showed extensive suppurative meningitis as well as effusion of blood under the pia mater. In addition section of the brain showed a very large blood clot occupying a great part of the left hemisphere.

To assess the part played by developmental defect in the production of cerebral paraplegia and diplegia is even more difficult. Collier,[8] in an important paper, which has clearly influenced much subsequent writing on the subject, is inclined to deny etiological significance to meningeal haemorrhage occurring at birth, and, basing his opinion upon *post-mortem* studies, to lay greater stress upon faults of development. Space will not permit a full discussion of this difficult question. We believe that in general it is true to say that in cases of diplegia due to developmental defect we find that the

whole personality of the child is upon a low plane, that there is little power of auto-education, and that physical defects are constantly associated with the mental defect. The purpose of this paper is to lay stress upon the high degree of mental development which many of these children damaged at birth ultimately achieve, however great the delay in acquiring certain functions may be in infancy and early childhood. The great improvement shown by many cases of birth injury after the first few years of life appears to us to be due, not to the completion of a developmental process which has been subject to a mere delay, but to the final success of a process of self-education which has been achieved by the child's persistence in overcoming difficulties much greater than fall to the lot of the normal infant.

To illustrate the type of case we have in mind the following three histories may be quoted.

Case 1.—A boy of 15, long thought to be grossly mentally defective, though his mother refused to believe it, with spastic gait, stiff and clumsy hands, exaggerated mouthing speech, a vacant expressionless face, and a loud meaningless laugh, has nevertheless two intimate and devoted friends of his own age. He is a great collector of stamps and something of an authority on them. These two friends of his have pushed their way beyond all this unpromising exterior and have found behind it something to repay them.

Case 2.—A girl of 17, who was brought to one of us first at the age of 7, did not walk or speak until she was 4, and was thought to be an idiot. She now speaks fluently though a little monotonously. She walks well on the level but has difficulties with staircases. She writes laboriously, her whole body stiffened with the effort to control the pen. Yet her imaginative powers are so good that she was the author of a little play performed by the girls at her school.

Case 3.—A boy born very prematurely walked with great difficulty and with many falls in his third year. At 4 years old he could only articulate ten words, but from the age of 3 he had fallen into the way of expressing his wants by singing. Thus when he wanted his toy soldiers he hummed clearly and distinctly and in perfect tune the air of the hymn "Onward, Christian soldiers." During all this time the parents were well aware that visitors regarded him as mentally defective. At 6 he began to be able to articulate more clearly and to speak fairly well. It was then discovered how retentive was his memory with regard to what his mother had read to him before he could speak. Asked to name the twelve Apostles he confessed himself beaten, but said, "I can see them walking in the desert. Some of them are in front, some of them are behind, and the one that takes the money is in a *taxi*." He often refers to this or that as happening "before I could speak." Now at the age of 9 he is still inefficient at certain movements which require control. His handwriting is very bad, and he feeds himself untidily and with difficulty. Yet he does well at school, is far beyond the average in mathematical ability, and has very good general knowledge. He loves games, but is very bad at them.

No one now thinks these children idiotic and imbecile—no one, at least, who judges by more than a glance at the exterior. Yet in early childhood so great was the delay in the education of the sensorimotor paths that such was the opinion in each case. Not all cases, of course, achieve so much, but all show great initial delay and a surprising degree of subsequent improvement.

The Latency of Symptoms during Early Infancy.

With the symptoms which result from the meningeal haemorrhage at the moment of birth we are not at present concerned. Though as a rule sufficiently definite, in the absence of expert examination they may pass unnoticed or their significance may not be appreciated. After recovery from the initial shock of the haemorrhage it is clear that, as a rule, a period of latency follows which lasts for many months. A consideration of the order in which the different parts of the brain are developed explains the length of the interval which usually intervenes between birth, when the damage is sustained, and the time when the child is brought to the doctor and complaint is made of failure to grasp, to sit, to walk, or to speak.

Physiologically the brain of the newborn is active only in part. Its small size and weight (380 grams) is due to the fact that it is composed almost entirely of grey matter. While the cellular elements are complete and are not to be added to during the whole of life, the myelin sheaths which surround the nerve processes of the cells and which give the white appearance to the subcortical layer of the adult brain are developed only in very small part. Only those fibres are medullated which are of immediate and vital importance to the newly born, those which preside over the functions of respiration, circulation, and nutrition, and those which have to do with certain reflex movements such as kicking, or automatic movements such as sucking. On the other hand, the fibres from the frontal, temporal, and occipital lobes, the commissural fibres (connecting the two halves of the cerebrum) and the projection fibres (connecting the cortex with the lower parts of the central nervous system) are not myelinated until a varying time after birth, and are therefore, so far as we know, incapable of carrying impulses either afferent or efferent. The paths, in other words, which render possible complicated and controlled motor action and equipoise of the body are not developed.

In the normal infant, therefore, at birth and for some time thereafter, the nervous mechanism at work is almost entirely that of the medulla and spinal cord. All movements are reflex in character because the psychomotor centres in the brain are not developed. It follows from this that in early infancy symptoms will result only from lesions which at the time of birth affected the medulla and lower centres, and that the permanent ill effects of lesions which at the time of birth affected the cerebral cortex will appear later. In early infancy the cortical areas, in this sense, may be said to be "a silent area" of the brain.

The medulla, on the contrary, is active from the first, and it is interesting to note that in our series, in every instance in which we were able to recognize diplegia in an infant before the end of the third month, there were present symptoms of damage to the medulla, and that it was for these symptoms that advice was sought. In two cases the chief symptom noted was dysphagia and clumsiness in sucking; in two aphonia; in two stertor, apparently from palatal paresis. One of these last was about to be admitted to the diphtheria ward. In another older child, in whom the stertor had persisted, an operation for removal of adenoids had been undertaken without producing any change. The first case described by MacNutt showed this symptom, which made her "start forward" with the thought of tracheotomy in her mind. The subsequent history of these cases showed that all suffered more or less severely from diplegia. The immediate mortality of cases with subtentorial haemorrhage and medullary injury is probably very high, and explains the rarity with which they are met.

The Ultimate Effect upon the Child's Physical Condition of Meningeal Haemorrhage at Birth.

At birth and for some little time afterwards movement is governed altogether by the older and basic cord innervation. The assumption of cortical control is gradual and can be traced throughout the first year of life. In infants with damage due to meningeal haemorrhage the supremacy of the cortex is delayed or incomplete, so that movements and reflexes characteristic of earliest infancy persist for many years or are permanent.

In mammals experimental ablation of the cortex is said to produce the following results—results which are fleeting and transitory in animals lower in the scale of development, but which are in some degree permanent in the higher apes, although the passage of time brings about very great improvement.

1. A state of rigidity or tonic contraction due to the removal of the inhibitory influences of the higher centres which normally moderate and control the reflexes which determine the muscular tone.

2. An interference with "reciprocal innervation"—that is to say, with the simultaneous relaxation of antagonistic muscles which must accompany voluntary muscular contraction if it is to be effective and precise.

3. A loss of motor power and an imperfect capacity for apprehending the position and form of objects by means of the muscular and cutaneous senses—that is, a psychical paralysis of sensibility and motion.

Such a description applies with equal truth to the state of the normal infant at birth, because of the non-development of the necessary myelin sheath of the nerve processes, and in varying degree to older children whose cortex has been damaged at birth. The muscles of these unfortunates are not powerless. They do not atrophy. They may even, when growth and nutrition is good, hypertrophy. Their failure to grasp, to walk, to speak, is due not to paresis of muscle, but to a disordered innervation which produces simultaneous contraction of antagonistic muscles. With the failure of the cortical control to develop efficiently, the muscular response to the voluntary impulse, though it may be powerful and very widely disseminated, is ill regulated and ineffective. In some cases, on any attempt at performing a voluntary action the unduly diffused nervous impulse provokes a spasm which involves almost all the muscles in the body, gripping the limbs in rigid tonus by the simultaneous contraction of antagonistic muscles.

The area of cortical damage or destruction determines the localization of the muscular defect. In many cases the damage is strictly confined to the uppermost parts of the Rolandic area, where lie the areas for the control of movements of the lower limbs. When the oozing of blood has been more extensive the damage may extend to the arm areas on either side, or finally to the areas for face, lips, and tongue. Although it is the rule rather than the exception to find the damage greater on one side than on the other, and paralysis is therefore present in unequal degree on the two sides, it is quite exceptional to find that one side has completely escaped and that hemiplegia has resulted. In true hemiplegia at birth it is probable that the lesion is within and not upon the surface of the brain. In the mildest cases paraplegia results, and in general cases of diplegia and cases of diplegia combined with pseudo-bulbar paralysis are due to more extensive and more severe injury. To this there are, however, exceptions. In not all the cases is the vertex cerebri the part to feel most severely the effect of the injury. Occasionally we meet with children whose arms are more affected than their legs, and with children in whom marked pseudo-bulbar symptoms are present with minimal symptoms of diplegia. Occasionally we find instead of spasm and hypertonus a very marked amyotonia, although the behaviour of the muscles upon attempted movement and the attitudes and involuntary movements which result are in other respects identical. It is possible that in these cases we have to deal with the results of subtentorial haemorrhage and a similar damage to the cerebellum. With cerebellar damage atonia, asthenia, and ataxia may be added to the picture.

Whatever the extent or distribution of the damage to the limb areas, when the child's body is at rest, nothing abnormal may be noticed. It is only the attempt to perform a voluntary movement which provokes the abnormal postures and spasm. Thus in cases of paraplegia the incapacity is often not apparent until the child is held in the upright position by the shoulders with feet hanging down to touch the ground. Then upon the attempt to walk or stand the legs become rigidly extended and adducted, so that the feet tend to cross in the so-called scissor gait, while the over-extension of the ankle brings the heels off the ground. It is not surprising that a child so affected may not achieve the power of standing for many years, when we consider how greatly the adductor spasm curtails the base upon which the body must be balanced. It is literally as difficult for such a child to walk as for a normal child to balance itself upon a tightrope. Similarly, on attempting to grasp, the child with diplegia finds the arms tend to become extended and adducted, the hands pronated, and the fingers separated and overextended. Once an object is grasped it can often be held firmly, though there may be difficulty again in relaxing the grip. The degree of spasm is very variable, but whether the limbs are held rigid or remain comparatively flexible to passive movement, the postures assumed on attempting voluntary movement are constant.

When the areas for the face, lips, and tongue have been damaged the expressionless face is very characteristic. The constantly changing facial play of the normal child is absent. The paresis is most marked about the lips, which are loose, prominent, and immobile. They are generally unable to retain the saliva, and when the child is held upright, so that saliva no longer gravitates to the back of the mouth, there is apt to be a great deal of dribbling. The reflex movements of sucking and the movements involved in chewing and swallowing are generally carried out sufficiently well to meet all requirements, although close observation of them will often show some slight loss of efficiency. Aerophagy is a common trouble. In a few cases the passage to solid food is only accomplished with great difficulty and after a long time. Speech is always greatly delayed. The complicated muscular movements involved are only learned slowly and with great difficulty. In the end the movements involved are exaggerated and the speech is mouthing and explosive. Dentals and labials present the greatest difficulties. The cry is expressionless and monotonous. It lacks the varying emotional tones which the normal child imparts to it. The laugh similarly is harsh and has no feeling in it. It is not, therefore, surprising that those who do not know the children well, who have no opportunity of recognizing the intelligence which lies hid behind the stiff face, and who judge by the immobile expression, the uncouth attempts at speech, the vacant laugh and unmeaning cry, are apt to consider the children as obviously imbecile or idiotic.

In the group of cases which we have studied and which we regard as examples of the late effects of meningeal haemorrhage occurring during labour, the Wassermann test was always negative, the optic discs were normal except in one case with extensive choroiditis, and developmental abnormalities in other parts of the body were absent. Apart from the microcephaly of slight degree which was present in some of the worst cases, the children, though often small and slim, were in no way deformed or misshapen. The bird-like face and narrow frontal region of true microcephaly were never found. The ears were not misshapen, there was no tendency to obesity. Especially when seen asleep, when the want of facial expression is not apparent, and when the awkward limbs are at rest, the impression conveyed to the eye may be that of health and even of beauty. In many of the cases a disfiguring strabismus develops at some time during early childhood. In infants it appears less common.

The Ultimate Effect upon the Child's Mental Development of Meningeal Haemorrhage Occurring at Birth.

The intellect even of an idiot is in continuous evolution, and the worst cases respond to patient and persistent education by showing improvement. The results achieved by education depend, however, upon the cause of the mental defect. In general least success will be achieved in cases, with or without spasticity, in which there is numerical deficiency, irregular arrangement, and imperfect development of cortical neurons. The greatest success, on the other hand, will follow when the delay in mental development is due to sense deprivation, as in the striking cases of children who are both blind and deaf and who have achieved a high degree of mental culture elaborated from cognitions derived entirely from sensations of touch. In this sense the children whom we are now considering occupy an intermediate position. It is true that the cortical cells have been damaged,* yet it would appear that, as a rule, though not perhaps always, the damage is sustained by one part of the cortex only—that which is concerned with the reception of tactile and muscular sensations and with the initiation of voluntary movements—and it is in these respects only that the children are defective. By every avenue which was closed to Helen Keller or to Laura Bridgman, both of whom from a very early age were blind and deaf, impulses freely reach the brain of these children. In due course the majority of them develop a high degree both of visual memory and of auditory word memory. But the one path by which Helen Keller and Laura Bridgman achieved so much is closed to them, or at least gravely obstructed.

It is by the sensations of touch and by muscle sense that the majority of impulses reach the brain during infancy. The baby carries every object to his mouth, that he may subject it to examination by lips and tongue, because they are most plentifully endowed with sensory nerve endings. As the cortex awakens to these repeated stimuli and develops under their influence the powers of the infant grow apace. Gradually the differential perception of stimuli becomes sufficiently advanced to enable the child to recognize the position of its body and limbs and to adjust them at will. It is the failure of the infant with diplegia to develop the power to sit or to grasp that usually first excites apprehension. The gradual change from the stiff spastic movements of the newborn to the freer play and more controlled action of the normal child at the sixth month is too subtle for its absence to be noted. But every mother knows that her baby should sit up before it is much older than six months. Thereafter the normal infant, able at will to adjust its body to space, developing a greater and greater mobility, accumulates knowledge at an ever-increasing rate by refining more and more its tactile, stereognostic, and muscular senses. The diplegic infant, relatively immobilized and anaesthetic, lags far behind. Few stimuli reach the brain, and therefore few elements capable of being utilized for new and more complex mental processes. For long the brain lies fallow. Hence it comes about, as we have almost always noticed, that during the second and perhaps the third years of life the mothers of these children have been intensely depressed by the visible

* It is possible that haemorrhage spreading over the frontal lobes may lead to a greater degree of mental defect, but we have no example of this in our series. We have, however, met with at least one case in which diplegia appears to be combined with amaurosis. It is possible that this is due to involvement of the occipital lobes. The child is under observation, and it may be possible to decide the point later. This child is backward and foolish in behaviour, but at the age of 4 can sing the air of the "Marseillaise" with spirit.

want of progress. On all sides they are assured that the child is grossly mentally defective. It is only their perception that the visual and auditory memory of the child is relatively unimpaired that accounts for their steadfast refusal to believe it. Except in a few of the worst cases with microcephaly, and especially when there have been repeated convulsions, the mothers of these children have throughout maintained that the intelligence is good, and that, although they cannot speak, they understand every word that is said and that their memory is good.

In another way also the diplegic is apt to contrast with the child who is mentally defective. In spastic idiots the attention is weak, and cannot be fixed on anything. They touch many objects one after the other, but show none of that curiosity which is truly attentive. Their actions are inconclusive; they show no joy in the exercise of their powers or patience in practising them. It is striking to watch how differently in these respects the child who suffered from injury at birth may act. More and more he works with us in the attempt to overcome his disability. Though he cannot walk, if he is held upright he works his stiff little limbs with a will, laughing aloud with delight. Little by little, with infinite pains, he learns to grasp, to balance, to walk, and when, years later, he too achieves a degree of mobility and control the improvement is striking. It is just this power of auto-education which is conspicuously lacking in the imbecile or the idiot. In later childhood the progress is often so rapid that the mother, previously so despondent, eagerly expresses her satisfaction, while she is now able to convince others easily enough that the mental powers of the child are considerable.

It is in general only when the sensory and motor loss extends to and involves the hands that the confusion with primary mental defect arises. Those who are only paraplegic walk late and with difficulty, but are not thought to be idiots. They may be excitable and restless, because their helplessness leaves them too long in their mothers' arms, without sufficient outlet for their energies, but of their cleverness there is often no doubt whatever.*

But when the hands, all-important as they are for the auto-education of the infant, are insensitive and paretic, for the time being contact with environment is almost completely lost. Head[9] has emphasized how extensive is the area of cortex which is devoted to the reception of sensations derived from the opposing surfaces of thumb and index finger. To the precision and complexity of the movements of the human hand, slowly acquired by the race in the course of ages, man owes his preservation and supremacy. And in the early months and years of life the infant, in its striving and progress, must recapitulate the story of its race. If it cannot, if the development of the hand is retarded, the avenue to the brain along which in normal infancy almost all the traffic passes is narrowed and obstructed. When there is added injury to the voluntary centres which control lips and tongue so that speech too is absent, the difficulties are still further increased. For speech is not only a means of expressing thought: speech clarifies thinking.

A long and close study of a group of some thirty of these cases—of all ages from earliest infancy to adolescence—has convinced us that they differ unmistakably from cases of primary mental defect with spasticity due to developmental causes. In a few frequent and persistent epileptiform convulsions have played havoc with the intelligence. After each convulsion the consequent deterioration in energy and achievement may be appreciable. But if convulsions are not present the defect commonly remains limited to a loss of voluntary movement and of sensation, involving a greater or a less extent of the body. The resulting retardation in development is most apparent in the first years of life, because education at that age proceeds by the refinement and analysis of sensation. The auditory and visual paths then are relatively unimportant. Gradually, by constant effort and with a success which varies with the extent of the original lesion, the child achieves in whole or in part that control of movement which comes so easily to the normal infant. From an early stage, however, those who know the children well can appreciate that despite the spastic limbs, the immobile face, or incoherent speech, the intelligence of the child is alert. Observation, memory, concentration of purpose, affection, intuition, and reasoning may be on a comparatively high level. No doubt the children are apt to be nervous and unstable. Like some caged animal, cut off from the stimulus of environment, they are apt to show strange traits—to have a capricious or unnatural appetite, to sleep badly, or to be unduly timid. These are drawbacks often perhaps inevitable, but with sheer mental defect they have nothing to do. In general it may be said that the response shown by these children to suitable education is remarkable. For them the methods elaborated by Dr. Montessori are especially applicable, and may give the happiest results. In later childhood, even when the voluntary movements remain very incoordinate, the mental powers may finally attain a very considerable development.

Conclusions.

1. Among cases of infantile diplegia or paraplegia it is possible to recognize a group in which the defect is confined to the sensorimotor cortical areas.

2. Probably all cases in this group are due to birth injury, although all cases of birth injury may not belong to the group.

3. Since education at first proceeds almost entirely by sensorimotor paths there is in early childhood a deceptive appearance of gross mental defect.

4. In later childhood progress may be rapid and recovery almost complete. The difficulty is overcome by the remarkable persistence in effort which is characteristic of most of these children. Even when voluntary movements remain stiff and awkward the child may be a quick learner by eye and ear. Inco-ordination may remain though character and intelligence may be on a high plane.

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* It is very probable that Lord Byron's lameness was due to paraplegia as a result of a birth injury. Whatever its nature, it is clear at least that it was not due to a "club-foot." The lasts on which his boots were made are piously preserved in the Nottingham Museum, and they are symmetrical and well shaped. Mr. John Murray, of Albemarle Street, has been good enough to show me two surgical boots made for Byron as a boy. They show a long and slender foot. By a contemporary writer the poet is described as entering a room with a curious running movement, "running rather than walking." Again, "He moved with a peculiar sliding gait . . . in fact, with the gait of a person walking on the balls and toes of his feet." It is clear that the disability was much greater in early childhood, and was overcome to a considerable extent as he grew older. As a child he was taken to John Hunter, to Dr. Baillie, and many other doctors. Later he played cricket for Harrow, though with someone to run for him, and was a great swimmer. In other respects he was almost as well endowed physically as mentally, of great strength and of amazing personal beauty. Again and again he refers to his lameness as caused by his mother's "*false modesty at his birth.*" He suffered from repeated epileptiform convulsions.

THE MODIFICATION OF GASTRIC FUNCTION BY MEANS OF DRUGS.*

BY

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EVERYONE engaged in the practice of medicine is aware of the gulf separating the beliefs of the physician actively occupied in treating diseases and their symptoms, from the knowledge, precise but meagre, of the experimental pharmacologist. Whereas human hope and optimism have during many ages collected a series of remedies, often of unknown or varying composition, which may do good, the critical scientist, meticulously rejecting everything incapable of objective proof, has been unable to point to more than a very few substances which have definite organic actions, and has been obliged to condemn, as apparently inactive, large numbers of those agents which had previously been held to be of curative value.

In no branch of medicine is this contrast more apparent than in that which deals with disorders of the stomach; for medical writers, from the earliest times, have given enormous lists of remedies for such conditions, but it is with difficulty that the student can find, in any modern textbook of pharmacology, reference to drugs which can in any way modify gastric function. There has, indeed, until recent

* A paper read before the Section of Therapeutics and Pharmacology, Royal Society of Medicine, October, 1922. The expenses incurred in connexion with the researches have been partially defrayed by a Government grant made through the Royal Society.

years been so little experimental work carried on in connexion with the stomach that the reticence of the pharmacologists is natural, and the growth of knowledge in physiology has made clear so many errors in the reasoning of earlier writers that the discrepancy between traditional belief and proven facts is to a large extent explained. In this paper it is my endeavour to collect some recent experimental work concerning substances which can be demonstrated to affect gastric function; they can, I think, be best classified into (1) those whose chief action is on gastric secretion, and (2) those whose action is rather on gastric motility.

SUBSTANCES AFFECTING GASTRIC SECRETION.

1. *Diminishing Gastric Secretion: Atropine.*

For producing this effect we have an effective drug—namely, atropine. Very conflicting accounts have been published as to its gastric effects; thus Crohn[1] reports failure to produce any diminution in gastric acidity, whilst Bastedo[2] states that the atropine completely fails to affect hyperacidity and only checks acidity in hypersecretory cases in the period after the digestive stage is over. Other observers, notably Chiari,[3] Mathieu,[4] Schmidt,[5] and Bergmann,[6] speak highly of the inhibitory effects of this drug, and my own observations are in complete accord with this belief.

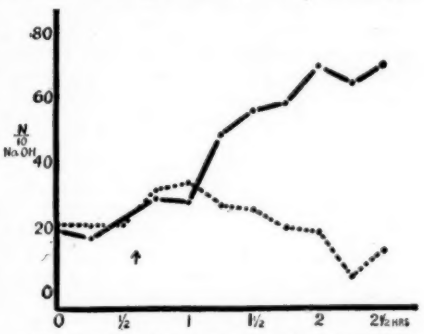

FIG. 1.—Showing effect on gastric secretion produced by hypodermic administration of atropine. Heavy line = subject's usual curve of HCl (fractional gastric analysis). Broken line = same after hypodermic injection of 1/30 grain atropine sulphate at point marked by arrow.

In Fig. 1 is seen the curve of free HCl obtained on fractional gastric analysis of a subject with a very free secretion of acid; the second curve shows the modification produced in this curve by the hypodermic injection of 1/100 grain of atropine sulphate. The effect is definite, and it must be observed that, the curve being obtained from analysis of gastric contents, it could not be expected that the atropine would affect the HCl which had already been poured into the stomach before the drug was administered.

But it is by oral administration of atropine or belladonna that the most marked effects can be produced. If the empty stomach be washed with a very weak solution of atropine even for a few moments, the fluid being then withdrawn, a marked inhibition of secretion is produced. Fig. 2 illustrates such a case, the heavy line being the subject's normal curve of gastric HCl, the broken line the curve subsequent to such a washing.

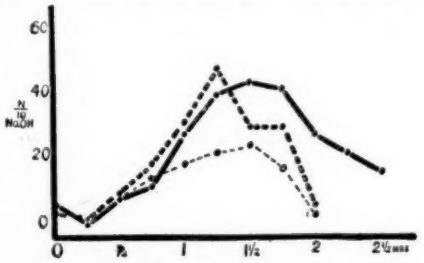

FIG. 3.—Showing effect on gastric secretion produced by washing the stomach with weak solution of pilocarpine. Heavy line = subject's usual curve of HCl (fractional gastric analysis). Broken line = curve after preliminary wash with weak solution of pilocarpine. Lowest line = more usual result, due to dilution of gastric content by saliva.

This is an experiment which I have many times repeated; it has been confirmed by Roberts,[7] and it can be said that this local effect of atropine on the gastric mucosa is as definite as is the effect of the same drug when applied to the conjunctiva. It is probably because observers have chosen the hypodermic route that discordant results have been obtained.

Since performing these experiments it has become my custom in practice, when I desire to reduce gastric secretion, to administer atropine in small doses and in a large volume of water, the whole being given on an empty stomach.

2. *Increasing Gastric Secretion.*

For this purpose pilocarpine has somewhat naturally been recommended, and with certain precautions an increase can actually be obtained. By washing the stomach with weak solutions I have sometimes succeeded in raising the curve of gastric HCl, as in Fig. 3, but usually, even when very small doses are applied, a local wash is absorbed, for the subject soon observes profuse salivation, and this saliva, if swallowed, will have a diluting effect on the stomach contents sufficient to reduce the acidity below its normal figure.

3. *Substances Affecting the Gastric Secretion after its Evolution.*

(a) *Substances Neutralizing Acid Secretion.*

In this group must be placed all the alkaline salts which have so long been used for the treatment of true or supposedly pathological excesses of gastric hydrochloric acid.

Following Pavlov, Bickel, Rosenblatt, and a score of others declared that such alkalis not only neutralized, but actually arrested the secretion of HCl by the stomach. Du Mesnil, Bourget, von Leube, and others were, however, of opinion that the alkalis, and particularly sodium bicarbonate, were actual stimulants to gastric secretion, a belief which had the support of Claude Bernard[8] himself. The fractional method of gastric analysis has enabled us to procure more definite evidence on this controversy than previously existed, and it has now been clearly shown that the effects of alkali administration are very much influenced by the time of administration.

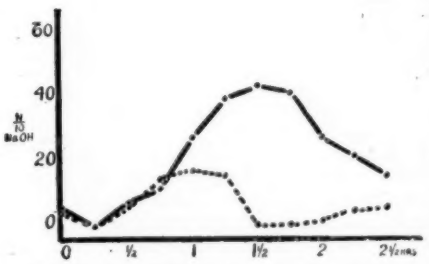

FIG. 2.—Showing effect on gastric secretion produced by washing the stomach with weak solution of atropine. Heavy line = subject's usual curve of HCl (fractional gastric analysis). Broken line = curve after preliminary wash with very weak solution of atropine.

In Fig. 4, for example, will be seen the normal curve of a healthy subject, and the curve from the same subject as influenced by giving sodium bicarbonate prior to a meal; it will be seen that during the period following the meal the alkali, rapidly neutralized, has led to an actual increase in the acid secretion.

In Fig. 5, on the other hand, is seen the effect of the administration of alkali at a later period; the acid already secreted is fully neutralized and a period of neutrality lasting nearly an hour is followed by a rapid rise in the gastric acidity to its usual level. Magnesium hydroxide 12 grains and sodium citrate 5 grains were employed in this experiment.

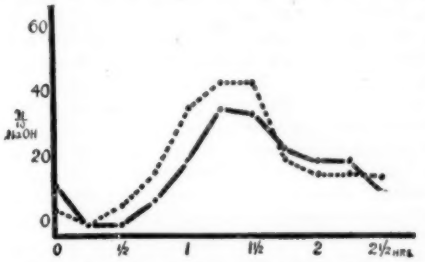

FIG. 4.—Showing increase in secretion of HCl produced by oral administration of sodium bicarbonate before meals. Heavy line = subject's normal curve. Broken line = curve when 120 grains of sodium bicarbonate had been given a quarter of an hour before meal.

In all such experiments it must be borne in mind that the gastric contents are not homogeneous, but the fractional method carefully employed does give samples which offer a reasonable idea of the reaction of the total stomach content. In general, from the experiments of Crohn[1] and from my own observations, I feel that it may be said:

1. That sodium bicarbonate tends to excite the gastric mucosa to increased secretion, and that this effect more than counterbalances the neutralizing effect of the salt.
2. That other salts, particularly magnesium oxide, and bismuth oxycarbonate, have far less stimulating effect, and the former, weight for weight, possesses greater neutralizing power.
3. That the rational method of employment of these salts in cases of hyperacidity is to administer them at such periods after meals as will lead to their neutralizing

effect coming into play without there being the possibility of producing any marked effect on the actual gastric cells.

4. That for producing inhibition of secretion reliance must be placed on drugs such as atropine and its derivatives.

5. That in gastric therapy sodium bicarbonate finds its greatest usefulness in those rather rare cases in which there is an excess of mucous secretion with low or absent hydrochloric acid.

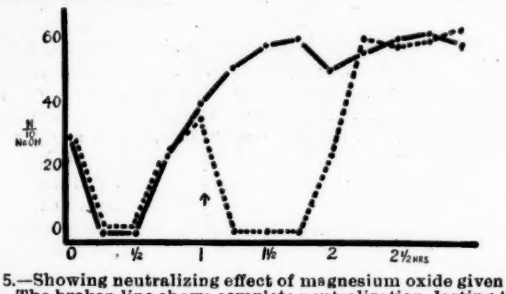

FIG. 5.—Showing neutralizing effect of magnesium oxide given after meals. The broken line shows complete neutralization, lasting three-quarters of an hour, produced by giving 12 grains of magnesium oxide.

(*b*) *Substances Replacing Deficient Acid Secretion: Hydrochloric Acid.*

In cases where the gastric secretion of HCl is deficient or absent it has long been customary to give HCl by mouth; the practice is justified both on logical grounds and by the results obtained, but it is of interest to consider what the mechanism may be by which the result is obtained. In the first place it must be recognized that in order to obtain a concentration of HCl anywhere near that seen in the normal subject very large amounts of the acid must be administered to patients with achlorhydria. Thus, if the volume of a meal be reckoned approximately to be about one pint, it is necessary to give nearly two drachms of the *B.P.* dilute acid in order to raise the concentration of that amount of water to 0.1 per cent. HCl, and as all normal meals contain protein, which readily absorbs HCl, a great deal more than that quantity must be given if a serious effort is being made to increase the acidity of the gastric contents.

These considerations apply to cases of achylia gastrica, for it is doubtful whether the administration of HCl to cases of mere hypochlorhydria has any effect at all. Boldyreff,[9] and more recently Rehfuss,[10] have shown that in normal subjects any artificial increase in the HCl of the stomach contents is followed by a compensatory regurgitation of alkali from the duodenum, which quickly restores the acidity to its normal level.

It is, then, difficult to believe that the small doses of HCl usually given in cases of achlorhydria can have any but a psychic effect; but given more rationally there can be no doubt that striking results are often obtained, particularly in cases of achylia with diarrhoea. An interesting case was recently reported[11] in which a doctor with severe chronic diarrhoea and anaemia was apparently cured by such means; in this case the physician administered as much as half a litre of 0.5 per cent. HCl to the patient daily, introducing the acid by means of a gastric tube. One is unable to accept this case as a proven one of Addison's anaemia—the blood picture was not conclusive; but that a striking cure of an almost desperate case was secured is beyond dispute. My experience with HCl in pernicious anaemia is less encouraging; I have often produced temporary improvement in the intestinal symptoms, but never obtained evidence of anything suggesting cure. In a recent case—a particularly severe one with little sign of regeneration—I gave as much as half a pint of 0.5 per cent. HCl daily to the patient without apparently arresting the disease in any way. It should be added that this case had no diarrhoea, and further that no trouble was experienced in giving the acid by mouth, it being sucked through a tube in order to protect the teeth.

When one comes to inquire critically as to the true effects of the HCl secreted by the stomach, one is obliged to say that in general its functions are not essential to the organism. Thus its hydrolytic effects on protein can be replaced by the action of enzymes in the small intestine; its effect on the closure of the pyloric sphincter, if definite, is not the only means of closing that valve; again, even if HCl does normally bring about pancreatic secretion on its entrance into the duodenum, it is certain that achlorhydric subjects have usually a perfectly normal secretion of pancreatic juice.

Two effects predominate, the first being that on pyloric closure. There is no doubt but that such cases of achylia gastrica, and especially those with pernicious anaemia, have rapidly emptying stomachs, and the addition of HCl slows down this process. The second great function of HCl would appear to be its antiseptic action, and here again its oral administration in cases of achylia is, I believe, fully justified. I have here a flask which contains fluid removed from the fasting stomach of a patient with duodenal ulcer; the concentration of HCl in this case was very great, being that of decinormal acid. You will observe that though this juice has now stood exposed to the air for six months it is quite odourless, and no microbic growth has occurred in it. Similar samples from achlorhydric cases are foul-smelling in the course of a day or two.

A NOTE ON THE BITTERS.

This section would be incomplete without reference to the bitters, a series of preparations which have long enjoyed high repute in gastric medication. Textbooks have at times attributed to the bitters an effect in stimulating gastric secretion; later they have been said merely to increase appetite, and still more recently it has been said that their effect is actually *nil*.

The most complete recent study is by Carlson[12]; he showed that in the fasting state the bitters have no effect upon the hunger contractions of the stomach, and further that no definite influence on gastric secretion could be demonstrated. His observations were largely obtained from a human subject in whom complete stenosis of the oesophagus had been relieved by the establishment of a permanent gastrostomy. This young man, who was otherwise in perfect health, made it his custom to chew up his food in the normal way, and then to inject it into his stomach by means of a syringe. Carlson made observations on the amount and quality of the juice which could readily be extracted from this subject's stomach, and in a series of experiments with bitters he measured the juice after the mouth had been washed out with gentian, quassia, columba, and other drugs. He was unable to obtain any evidence of an increase in gastric secretion, nor did this subject observe any increase in appetite.

Carlson made a further series of observations on patients with loss of appetite; it was found that though the patients often said that their appetite had been improved by these medicines, measurement of their food consumption showed an increase of little more than 2 oz. in the amount eaten at each meal.

Making observations on the gastric secretion by means of the modified Einhorn tube, I have never been able to secure any definite increase in secretion by giving the subjects bitters as a preliminary mouth-wash; in several cases there has been an apparent decrease in HCl secretion, an effect which I believe is due to the somewhat profuse salivation sometimes caused. As in the case of pilocarpine, such saliva, if swallowed, will tend to dilute the gastric contents, and so diminish acidity.

It must, then, be concluded that we have no evidence of any marked effect on gastric function produced by the bitters, but there should, I think, be added the rider that, in fatigued states, the alcohol in which the bitters of the commonly used *apéritifs* are dissolved often removes from the subject unpleasant fatigue symptoms which may be a serious factor in inhibiting appetite, and possibly digestion also. Put in cruder terms, it is probable that a whisky and soda, or the army rum ration, is as effective an aid to appetite and digestion as is the more conventional cocktail, or sherry and bitters, or the less attractive condurango or quassia water.

DRUGS AFFECTING GASTRIC MOTILITY.

1. *Atropine.*

In the work to which I have already referred I found that in addition to its inhibitory action on secretion, there was evidence that atropine delayed gastric emptying. The effect was, however, not marked; whether by its hypodermic use or by its local application, the delay in emptying did not as a rule exceed a quarter of an hour with a test meal of the usual composition.

But it must be remembered that strong evidence exists showing that in cases of abnormal spasm of the gastric musculature the effect of atropine may be very marked. It has, indeed, become a matter of everyday radiographic practice to give large doses of this drug in order that the under-

lying cause of such spasms may be sought for. Thus it is no unusual thing for a patient with gastric ulcer to exhibit hour-glass constriction of the stomach on *x*-ray examination; if, however, he be re-examined after administration of full doses of atropine for three days, the constriction is seen to have disappeared, and the crater of an ulcer is often demonstrable. In cases of pylorospasm without discoverable organic lesion the patient's condition is sometimes remarkably improved by atropine treatment; one feels that such cases of disturbed gastric rhythm may to some degree be compared to those cases of auricular fibrillation with tachycardia which derive such striking benefit from the heart-block produced by the digitalis group.

2. *Pilocarpine.*

Fractional gastric analysis before and after lavage with pilocarpine demonstrates an increased rapidity of emptying after the use of this drug. The change is of a degree equivalent to the delay by atropine, and no really striking effect can be produced by doses which are within the limits of safety.

3. *Strychnine.*

This drug has long been given an important place in gastric therapeutics as a supposed means of increasing gastric motility. An elaborate investigation recently published by an Italian observer, A. Berti,[13] enables us to examine the question to-day from a better informed standpoint.

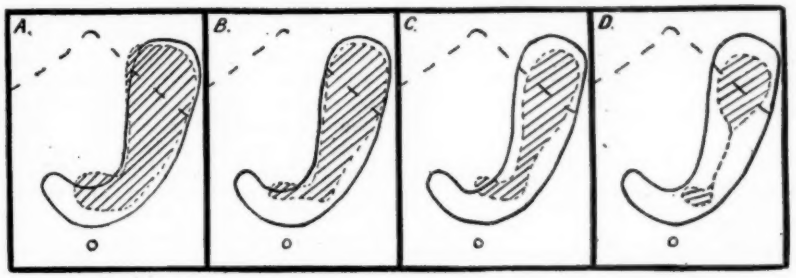

FIG. 6.—Showing the effect on gastric motility produced by strychnine. A, 0.5 milligram; B, 2 milligrams; C, 4 milligrams; D, 6 milligrams. (After Berti.)

In addition to a considerable number of experiments on cats, Berti carried out a large series of observations on human beings, more than fifty subjects being employed, some of them being healthy students, others patients with visceroptosis. All were examined under strict experimental conditions. At 8 a.m. an enema was given to secure complete evacuation of the colon; at 9 a.m. a test meal consisting of milky gruel containing barium and bismuth salts was swallowed, and *x*-ray observations of the stomach were then made half-hourly until the organ was empty. Two such observations were made on each subject, one with the plain meal, the other after administration of strychnine, several weeks being allowed to intervene between the two observations.

The strychnine was given in varying doses, both by mouth and hypodermically, with results which may be summarized as follows:

Nitrate of Strychnine given by Mouth.

(*a*) *Half-milligram.*—At first peristaltic movements were increased both in rapidity and depth and there was a marked diminution in the size of the pyloric antrum, evacuation of the stomach began sooner, and continued more rapidly than normal. Observed an hour later the peristaltic movements had lost much of their intensity, but the net effect of the drug had been to accelerate gastric emptying by more than half an hour. (Fig. 6, A.)

(*b*) *One Milligram.*—Again there was marked initial increase in peristaltic movement, but after an hour the contraction of the pars pylorica was sufficient to delay emptying, and, the peristaltic waves having become very feeble, there was on the whole a delay in the complete emptying of the stomach.

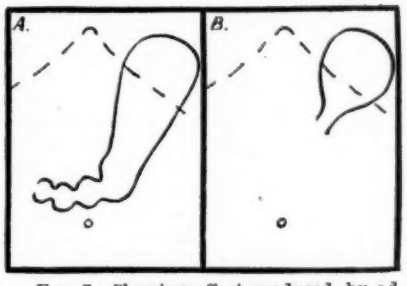

FIG. 7.—Showing effect produced by administration of strychnine. A, 3 milligrams; B, 4 milligrams. (After Berti.)

(*c*) *Two Milligrams.*—With this dosage the initial gastric movements were precipitate, there being a marked hypertonus of the pyloric region, violent peristaltic waves coming along the greater curvature, two or three being simultaneously visible, the whole producing a marked increase in the volume evacuated from the stomach in the first half-hour. But after the first hour these movements became feebler and feebler, hypertonus persisted, and the net effect was that there was considerable delay in complete gastric emptying. (Fig. 6, B.)

(*d*) *Three and Four Milligrams.*—The above phenomena were further accentuated; at first violent peristaltic waves coursed along to the pyloric region, where they often became arrested, forming an appearance suggestive of a string of sausages, or even contracting this portion to such an extent that the cardiac end of the stomach alone was visible. And again there was a rapid tiring of these waves so that final evacuation was retarded, the stomach often emptying an hour later than the normal. (Figs. 6, C, and 7.)

(*e*) *Five or Six Milligrams.*—Here was seen the final expression of these phenomena, an initial rapidity of emptying being followed by the production of an hour-glass appearance. The general hypertonus appeared to be so great as to prevent peristaltic movement, the final hour-glass appearance being due to an extreme persistent contraction similar to that often observed in cases of saddle-ulcer of the lesser curvature. (Fig. 6, D.)

Hypodermic Administration.

With this method of administration the above effects were produced with smaller doses, in general each hypodermic dose producing the effect of about double the quantity taken by mouth

My own work with strychnine has been limited, but several observations which I have made tend to confirm these findings, and it must, I think, be concluded that to produce any beneficial effect on gastric atony very small doses of strychnine must be employed. The effects of larger doses are of considerable interest in throwing light both on the physiology of the stomach and on the motor disturbances of chronic ulceration. They seem to demonstrate once more the essential difference which exists between the motor functions of the fundus and those of the pyloric portion of the stomach, and they elucidate the phenomena by which spasmodic hour-glass constrictions are produced.

When speaking of the motor effects of atropine I drew attention to the power of this drug in controlling spasm; it would be an interesting experiment to see whether strychnine spasm of the stomach could be controlled in this way.

A NOTE ON ADRENALINE.

The use of this substance in gastric therapeutics is, as far as I am aware, confined to cases where it has been employed in the endeavour to check haemorrhage. It should, on theoretical grounds, be capable of affecting both gastric secretion and gastric motility if its action could be brought to bear on the sympathetic nerve fibres supplying the stomach.

In 1920 Venables and I[14] were able to demonstrate the very marked gastric effects which can be produced by unpleasant psychic influences—the suggestion of nausea or of fear being sufficient to delay gastric emptying for a considerable time and to inhibit the secretion of acid. It has been the custom of many physiologists to explain such effects as being the result of an increased outpouring of the internal secretion of the adrenals into the blood stream, with consequent effects on local tissues supplied with sympathetic fibres.

With such ideas in mind, I have carried out a series of experiments on normal men. On each subject two observations were made—in one the stomach was washed with water and a test meal given after, in the other the stomach was washed with adrenaline in various strengths and the test meal given as before. I have been able to obtain no evidence of any gastric effect of adrenaline by this means, though I have used strengths of as much as 1 in 5, and have used sufficient to ensure a washing of the greater part of the gastric mucosa.

In a second series of observations the substance was used hypodermically, water being used in the controls. Again I have failed to demonstrate any gastric effect, though various doses have been tried, and blood pressure and subjective effects have sometimes been demonstrable.

Whether the use of adrenaline in cases of haematemesis is wise is at present a matter of controversy; that it has any effect on gastric secretion or motility my present series of observations does not support.

It is probable that the future will produce much experi-

mental work which will enable us to employ a greater variety of drugs with definite effects on gastric function; it has been my endeavour in this paper to show that we already have a limited series of such substances, and I feel that the selection of those with appropriate actions must lead to a steady improvement in gastric therapeutics.

I would in conclusion express my thanks to my colleagues and the students of the Middlesex Hospital, in whose physiological department all my recent experiments have been conducted, and on whose generous help I have always been dependent.

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THE TREATMENT OF KALA-AZAR BY "BAYER 205."

BY

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THE following case, in which the drug "Bayer 205" was used with success in the treatment of kala-azar, is worthy of record, more especially as the only case hitherto reported ended disastrously.

A lascar, aged 22, left Bengal, in apparently good health, at the end of July, 1922. He became ill on August 12th, and in September noticed a swelling in the abdomen. He was treated with quinine on board ship and also at Cape Town, but did not improve and steadily lost weight. On November 8th he was sent to the Liverpool School of Tropical Medicine as a case of malaria with enlarged liver and spleen. He was emaciated (weight 95½ lb.), the liver and spleen were considerably enlarged, the latter extending well below the umbilicus to within three fingerbreadths of the brim of the pelvis; the temperature was 100° F., and the pulse 90 to 100. Examination of the blood for malaria parasites was negative. A leucocyte count revealed marked leucopenia—2,000 leucocytes per cubic millimetre. On careful searching of a whole blood film a single *Leishmania* was found. The faeces were normal and negative, except for the presence of a few *Ascaris* eggs. On November 13th the weight was 94 lb. A few *Leishmania* were again found in the blood on November 15th, and a spleen puncture made the following day revealed the presence of the parasites in very large numbers. The blood gave a well marked formol-gel reaction, and the urine contained a faint trace of albumin.

It was decided to treat the patient with tartar emetic administered by the rectum, and from November 16th to 20th daily injections of 1 grain in half an ounce of water were given; from November 21st to 23rd the daily dose was increased to 2½ grains of tartar emetic. The temperature, which, except for a couple of rises to 100° F., had been normal until November 19th, commenced to rise on this date and continued to oscillate between 100° and 101° F.; the weight on November 23rd was 93 lb. No injections were given from November 24th to 26th, but on November 27th injections of 2½ grains were resumed and continued to December 20th. The temperature remained above normal, rising at times as high as 102° F., until December 2nd, when it again became normal and has since remained so. The weight, however, gradually decreased until December 17th, when it was only 88 lb. On December 11th the leucocyte count had increased to 5,000 per cubic millimetre, but on December 12th a few *Leishmania* were found in the peripheral blood.

From November 16th to December 20th the patient had received by the rectum a total of 105 grains of tartar emetic; the injections, which were only half an ounce in volume, were well retained, and that some antimony at least was absorbed there is no doubt, as the urine examined on November 21st, and on subsequent occasions, was found to contain very definite quantities of the drug.

From December 21st to 27th no treatment was given. A spleen puncture made on the latter date revealed the presence of *Leishmania* in considerable numbers, but, so far as one could judge, not in such great numbers as on the occasion of the previous puncture on November 16th. On December 23rd the weight was 91 lb., an increase of 3 lb. during the week.

Whilst, therefore, there is some evidence that the intrarectal course of tartar emetic had been beneficial to the patient, and had possibly to some extent reduced the mass of the infection, and perhaps might have resulted in still further benefit had it been continued, it is obvious that it had by no means cured the disease. Under its influence the temperature had returned to normal, the general condition of the patient had improved, the leucocyte count had risen, and the parasites in the spleen had apparently become less numerous; but, on the other hand, the weight had continued to fall, the spleen and liver had not decreased in size, and parasites had disappeared neither from the peripheral blood nor from the spleen.

It was then determined to ascertain the effect of "Bayer 205" on this disease. The formula of the drug, which is a preparation of the German chemical firm Messrs. Friedr. Bayer and Co. of Elberfeld, has not yet been disclosed. It has recently been used with great success in the treatment of trypanosomiasis of man and stock. It has also been tried in various other diseases of man and stock—namely, in malaria, recurrent fever, and general paralysis of man, and in the piroplasmoses of domestic animals—but without any success.

So far as I am aware, the only occasion on which the drug has been used in kala-azar is the case recently recorded by Mollow (1922). In this case only a very small dose (0.2 gram) was given, but the result was disastrous, the patient quickly developing alarming symptoms—severe rigors, headache, haemorrhages from nose and gums, severe vomiting which later became haemorrhagic, and collapse; later the patient became violently delirious, and finally death occurred sixteen hours after the injection. In view of this record the treatment of the present case by "Bayer 205" was undertaken with some little trepidation.

On December 23th an intravenous injection of 0.25 gram of "Bayer 205" was given. This injection, which in Mollow's case had rapidly proved fatal, produced not the slightest effect in the present case; the temperature remained normal, and the patient complained of no unusual sensation. On December 30th the weight had increased to 93 lb., and a second intravenous injection of 0.5 gram of "Bayer 205" was given; this likewise was attended by no ill effect—the temperature remained unchanged, the patient complained of nothing, and the urine remained normal. On January 2nd it was noticed that the spleen had shrunk perceptibly, and a third injection of 1 gram of the drug was then given, and again no reaction was observed. On the following day the weight was 96 lb. On January 5th it was noticed that the spleen had further decreased considerably in size; a final injection of 1 gram of the drug was given on this date, and, as on the previous occasion, was unattended by any rise of temperature or other sign of reaction. By January 8th the spleen had shrunk at least two inches, and was well above the umbilicus. On January 13th the weight was 101 lb., and the spleen had shrunk still further; a trace of albumin was found in the urine. On January 20th a spleen puncture was made, but no parasites were found; the weight was 103 lb. On January 28th another spleen puncture was made, and this was also negative; the spleen had decreased in size to such a degree that it now extended only about 1½ inches below the costal margin, and a somewhat comparable though less obvious decrease in size of the liver was also noted; the formol-gel reaction was still positive, the urine no longer contained albumin, and the weight had increased to 105 lb. The patient sailed for India apparently in excellent health on January 30th.

The history of this case suggests that "Bayer 205" has a very definite and rapid action in kala-azar. The injection of the drug was followed by no ill effect; the spleen rapidly decreased in size, as did also the liver, though to a less obvious extent; the general condition of the patient improved, he rapidly gained in weight, putting on 14 lb. within a month, and two spleen punctures, made respectively fifteen days and twenty-three days after the last injection of the drug, were both negative.

Possibly the violent and rapidly fatal symptoms observed in Mollow's case after the administration of so small a dose of the drug as 0.2 gram are to be explained, as the author suggests, on the ground that the patient was in an extremely poor condition at the time of the injection.

I am indebted to Messrs. Friedr. Bayer and Co. for kindly supplying me with a quantity of "Bayer 205" for trial.

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A ROMAN Catholic Congress on the question of population will be held at Tilburg or Breda on April 12th and 13th, when the medical aspects of the question will be discussed by Professor Frans Daels of Ghent and Dr. A. W. Aussens of Utrecht.

DR. SOPHIE A. NORDHOFF-JUNG of Washington has founded an annual prize of 500 dollars, to bear her name, for the best work on the etiology, prophylaxis, and treatment of cancer. The judges will consist of members of the Munich Medical Faculty. The first award will be made at the end of this year.

THE TREATMENT OF ANKYLOSTOMIASIS WITH BETA-NAPHTHOL AND THYMOL.

BY

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THE following notes on the treatment for ankylostomiasis which I have carried out for the past eighteen months in Zanzibar and Pemba, where the disease is very prevalent and known as "safuri" and "baridi," may be worth recording.

If the patients are debilitated and anaemic, as the majority are, before commencing the treatment proper I give them thrice daily a tonic containing ferri et ammon. citr., liquor arsenicalis, and liquor ammon. fort., which is continued in the intervals of treatment, and also afterwards until the patient is quite strong.

If possible I have them in hospital for preparation and treatment, or if they are unable to stay in hospital I get them to come in for one day weekly for treatment, which is as follows: In the evening I give a powder containing calomel 5 grains and sodium bicarbonate 10 grains. This is followed at 7 o'clock next morning with a draught of sodium sulphate 3 drachms, in water to 3 ounces. At 8 a.m. I give a mixture containing beta-naphthol 1/2 drachm, thymol 1/2 drachm, mucilage q.s., and water to 1 ounce. At 10 a.m. I repeat the beta-naphthol and thymol mixture, and keep the patients in bed until about 4 p.m., not allowing them any food or liquid whatever; after that time they are allowed fluid diet only for the remainder of the day. Those desiring to leave hospital may do so, to report again in seven days for treatment; but they send a specimen of their faeces on the day after leaving hospital for microscopical examination for the ova of ankylostoma. This is done after each treatment until free.

Of 171 cases treated I have been able to follow out the results of 116, the remainder not having reported for further treatment. The results are as follows: After one treatment, 34.5 per cent. were cured; after two treatments, 25 per cent.; after three, 17 per cent.; after four, 13 per cent.; after five, 6 per cent.; after six, 7 per cent.; after seven, 4 per cent.; after eight, 1 per cent. I have not given the fractions of the percentage, but have taken it to the nearest figure. In no case did I give more than eight treatments.

It is interesting to note that in some cases other well known treatments had been previously tried without effect, as the following cases will show:

Case 1.—After ten treatments of thymol ova were still present; the case was negative after three treatments with beta-naphthol and thymol.

Case 2.—After thirty-two thymol and three oil of eucalyptus treatments ova were still present; the case was negative after three treatments with beta-naphthol and thymol.

Case 3.—After three treatments with oil of chenopodium ova were still present; the case was negative after one beta-naphthol and thymol treatment.

Case 4.—After prolonged antimony treatment the case was still positive, but became negative after one treatment with beta-naphthol and thymol.

On examination of stools taken where the patient had no treatment after being (microscopically) free, the following results were found:

After *one* treatment the result of examination was negative after 7 months in one case, and after 4 months in another, but was positive after 5 months in a third.

After *three* treatments, two cases showed a negative result after 3 and 4 months respectively.

Of two cases which received *four* treatments, one was negative after 4 months, the other positive after 3½ months.

Of three cases which received *five* treatments, the first was negative after 2½ months, the second after 3 months; the third was still positive after 2 months.

One case which received *seven* treatments was negative after 2 months.

Two mental cases of melancholia and senile debility died after the second treatment, but showed no ill effects succeeding the treatment. In no single instance did I find the treatment affect the patients, and on the day following they were able to continue their work in the ordinary way.

It is difficult in such places as this to follow up one's patients as one would wish, and, moreover, the environment of the natives is one in which they are very likely to become reinfected after being free, because of their habits in going about barefooted and the frequent sores on their feet owing to jiggers, etc. I think, however, that a result showing roughly 89 per cent. of cures in four treatments will justify a trial of the method.

I am indebted to Dr. B. Spearman, M.O.H. Zanzibar, and to his bacteriological department, for their examinations of the specimens of the above cases.

A SPLINT FOR MEDIAN PARALYSIS.

BY

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PHYSIOLOGICAL rest is a prime necessity in the recovery of a paralysed muscle. This is brought about by the mechanical approximation and retention of its two points of insertion so that its opponent is conversely elongated.

One of the difficulties hitherto in the treatment of a median lesion has been the proper retention of the median small thumb muscles in a properly relaxed position so that regeneration can take place with the greatest chance of success. A majority of cases do not show a satisfactory return to power of the opponens and short abductor of the thumb, as is evident in the number of cases of median lesions with a flat thenar eminence and inability to oppose the thumb to any of the other fingers. This is one of the most important movements in the useful hand, and is necessary for all the fine movements of the hand. Without it the utility of the hand is impaired by at least 30 per cent. As Mackenzie aptly puts it, the thumb represents one blade of a dissecting forceps.

FIG. 1.—Showing the extreme flattening of the hand with the thumb "flush" with the palm and no power of apposition. Short thumb muscles are accordingly stretched.

The only method so far of in any way relaxing the short thumb muscles is by means of adhesive strapping applied round the thumb and the ulnar side of the hand. This has two important disadvantages. The skin of the hand, already without its beneficent trophic influence, rapidly becomes irritated and often becomes broken so that the adhesive plaster has to be removed. When wearing the plaster the patient's hand is entirely put out of action and he cannot use it for gripping, while the rubber solution in warm weather runs and becomes caught in anything he may attempt to grip. So irksome is it to the patient that it is usually worn only very intermittently.

FIG. 2.—Splint applied. Thumb opposed and opponens and abductor relaxed. In useful position and splint not preventing use.

The splint to be described has neither of the advantages that its only rival has, for the skin is amply protected by its chamois leather lining, while it in no way interferes with function, but rather aids it in making opposition of fingers and thumb possible.

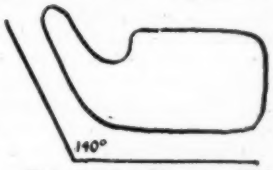

FIG. 3.—Drawing of the duralumin plate when flattened out. The thumb-piece is attached to the hand-piece at an angle of 140 degrees.

Description.

The essential part of the splint (called the "Opponens splint") is a light duralumin plate which extends from the fifth metacarpal to the first and extends the length of the metacarpals except in the thumb, where it is rather longer, going just over the metacarpo-phalangeal joint. The plate is accurately moulded round a cast of the hand which has been made with the thumb in the opposed position in the same axis as the middle finger and with the first metacarpal abducted from the second as far as possible—that is, up towards the face of the patient when the forearm is supinated.

It is in this position that we get complete physiological rest for the small median muscles of the thumb.

The duralumin plate is then encased in leather and with a special pocket for the thumb part. The covering is ordinary glove leather and the lining is chamois. Along the ulnar border is the opening, which is closed after putting on by lacing through eyeholes. The photographs show the efficiency of the appliance. In Fig. 1 the thumb is flat and flush with the hand, giving little hope of any recovery taking place in the muscles. Fig. 2 shows the correct position of rest and also the fact that the hand can be easily used while the splint is worn. A rough drawing of the duralumin splint when flattened out is given to show the shape (Fig. 3).

I have to acknowledge the valuable assistance of Mr. Arch. Young, Forrest Road, Edinburgh, who makes the splint.

THE RELATION OF SCIATICA TO THE SACRO-ILIAC JOINT.

BY

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SCIATICA is commonly defined as pain in the distribution of the sciatic nerve. Both neuritis and neuralgia of the nerve are included under the term. The most frequent condition giving rise to the pain appears to be a much disputed point. Observers appear to be divided into two schools according to their opinion as to whether neuritis or neuralgia is the more common condition. Gowers[1] regards all cases with persistent tenderness of the nerve as neuritis, and consequently he considers neuralgia as rare. Oppenheim[2] considers that in most cases the signs of neuritis are absent. Barre and Duprez[3] consider that if pressure on the nerve causes acute pain the case is not one of neuralgia. As most cases have this pain on pressure, these two observers must consider neuritis as the common condition. Holmes,[4] however, points out that the nerve trunks are tender in facial neuralgia when no disease of the nerve can be found.

I have recently reviewed my notes on forty successive cases of sciatica which have been referred to me for treatment, and I have been struck by two facts: The first is the great frequency with which sacro-iliac joint pain is found associated with the nerve pain; I have found the joint pain present in most cases of under six months' duration, but that it tends to disappear, although the nerve pain persists. The second point is that pressure on the sacro-iliac joint, in nearly all cases, causes acute pain down the course of the nerve, which, with pressure on the joint, is much more severe than the pain caused by local pressure on the painful spots down the course of the nerve.

From the above facts I have formed the opinion that some morbid condition in or about the sacro-iliac joint (probably an arthritis or a periarthritis) is usually the cause of the pain in sciatica. Further, that the pain is usually neuralgic.

The connexion between the joint and the nerve in cases of sciatica has been noticed by other observers. Barre and Duprez[3] observed the connexion, and coined the term "sacro-iliac sciatica." They also noticed that in early cases there is frequently sacro-iliac joint pain which tends to disappear. Gowers[1] states: "The neuritis (sciatic) often arises by extension of adjacent rheumatic affections of the fibrous tissues, especially that form of 'lumbago' which involves the fibrous attachment of muscles to the back of the sacrum, less commonly in its ordinary site." Probably those cases of "lumbago" were painful sacro-iliac joints and the sciatica was neuralgic.

Gibson,[5] in an analysis of 1,000 cases, found lumbago in 132, but he considers that number too low, as many patients overlook the slight pain owing to the more severe sciatic pain. It is probable that those cases of lumbago were those with painful sacro-iliac joints, as most patients refer to any pain in the lower part of the back as "lumbago."

Anatomy.

There is a close relation between the sacro-iliac joint and the sciatic nerve. The lumbo-sacral plexus is the source of origin of the nerve, and it also gives a nerve supply to the joint; a morbid condition of the joint, therefore, would cause referred pain down the nerve. The plexus lies immediately in front of the joint, being separated from it only by the pyriformis muscle. A periarthritis could, by extension, set up a neuritis of the nerve.

I do not consider that a local neuritis is common, otherwise one would expect most pain to be around the joint instead of down the nerve. On the other hand, in neuralgia the pain is frequently felt at some distance from its source of origin.

Clinical.

Bending and walking cause severe pain in patients suffering from sciatica. Both these actions cause strain on the sacro-iliac joint. Assuming that there is an arthritis of the joint, an exacerbation of the pain would be expected.

Lasègue's sign (flexion of the hip with knee extended) is used to test for sciatica. This movement not only stretches the nerve, but also puts a strain on the joint; consequently it can be used to test for sciatica, whether due to neuritis or a morbid condition of the sacro-iliac joint.

In cases of sciatica the patient usually obtains almost immediate relief by lying down, especially in the semi-prone position with hip and knee slightly flexed. This is the position in which all strain is removed from the joint. One can readily understand how this position would give relief so quickly if the joint is the cause of the trouble, but it is not so easy to see how it would be obtained if the trouble is neuritis.

Treatment.

Considering the sacro-iliac joint as the seat of disturbance in cases of sciatica, it has been my custom to apply treatment towards that part and not towards the course of the nerve. The results have been striking in most cases, and could not have been obtained if the joint had not been the cause of the pain.

In early cases, mainly when there is pain in the joint, I have found that radiant heat and massage to the joint is very effective. In older cases I have found that ionization with iodine ions and massage to the joint usually give relief. Anodal galvanism to the painful spots down the course of the nerve can be given conveniently with the ionization. In some cases it is necessary to break down adhesions in the joint; this can be done by Swedish remedial exercises and also by means of the movement which is adopted in nerve stretching.

Recently I have tried diathermy in all cases, and I have found that the results are better than with any other form of treatment, especially in old-standing cases.

Analysis of Forty Successive Cases of Sciatica.

Of the 40 cases 14 were of less than six months' duration; in 2 of these the pain was situated in the nerve, and in 12 in joint and nerve. There were 26 cases of more than six months' duration; in 15 of these the pain was in the nerve, and in 9 in joint and nerve. There were 2 cases of hip disease.

Duration and Situation of Pain.	Effect of Pressure on Sacro-iliac Joint.			
	Pain in Nerve and Joint.	Pain in Nerve only.	Pain in Joint only.	No Pain.
Group 1: Under six months—in nerve and joint.	11	0	1	0
Group 2: Under six months—in nerve only.	2	0	0	0
Group 3: Over six months—in nerve and joint.	6	0	3	0
Group 4: Over six months—in nerve only.	11	2	1	1
Totals	30	2	5	1

Three cases showed definite signs of neuritis—namely, muscle wasting, sensory changes, etc. Two of these cases belonged to Group 3, and only gave pain in the joint alone on pressure on joint. One case belonged to Group 4, and gave no pain with pressure on the joint. The 6 cases which did not give any response down the nerve with pressure on the joint did not respond to treatment at all. Of the remaining cases trace was lost of 3, there was no improvement in 2, a cure was effected in 12, and in addition 15 were in different stages of improvement.

Summary.

Out of 38 cases only 3 had neither signs nor symptoms in the sacro-iliac joint.

Thirty-two cases had a positive response down the nerve to pressure on the joint. Of these cases 27 were improved by treatment of the joint.

In 12 cases out of 14 of under six months' duration there was pain in the joint as well as down the course of the nerve.

In only 9 cases out of 24 over six months' duration was there pain in the joint.

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PORTAL PYAEMIA SECONDARY TO UMBILICAL INFECTION.

BY

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SUPPURATIVE pylephlebitis, as a result of spreading infection from the umbilicus, is rarely seen nowadays. The case here reported is of interest from several points of view, especially as there was no sign of inflammation of the umbilicus when the infant was admitted to hospital sixteen days after birth.

History.

On November 30th, 1922, when I was house-physician to the Royal Waterloo Hospital, a female infant aged 16 days was admitted at 9 p.m. on account of swelling of the abdomen, first noted twelve hours previously. There had been no action of the bowels for two days, even after a dose of castor oil, and an enema given that morning returned clear. Some blood and mucus had been passed per rectum during the last eighteen hours. The mother stated that the child had had several "convulsions" within a few days of birth, but had appeared healthy until three days before admission, when the skin became yellow. There had been no vomiting.

The infant was fairly well nourished, it was rather deeply jaundiced, and the marked abdominal distension rendered palpation difficult. The umbilicus was perfectly healed, the temperature was subnormal, but the pulse rate was rapid (uncountable). The abdomen was hyper-resonant from distension with gas, the liver was distinctly enlarged, but no other swelling could be detected on palpation. The rectum, the anal canal, and the lower part of the rectum felt swollen and boggy, and the examining finger was streaked with blood.

Mr. Cairns Forsyth saw the child an hour after admission, and the likely causes of the condition were discussed. The onset of the jaundice was too late for physiological jaundice of the newborn, and rather early and abrupt for that due to atresia of the bile ducts. Infection spreading to the liver by the umbilical vein was regarded as improbable, since the umbilicus was soundly healed and the temperature was subnormal. No conclusion as to the origin of the jaundice was arrived at; but since the infant was obviously suffering from intestinal obstruction it was decided that exploratory laparotomy was justifiable.

Operation.

When the child was under anaesthesia the abdomen was again palpated, but no swelling could be detected. The abdomen was opened by a small paracentral incision, the right rectus being displaced outwards. Some clear fluid escaped as soon as the peritoneum was incised and coils of intensely congested small intestine protruded into the wound. No signs of mechanical obstruction of the bowel could be found. The small intestine was everywhere distended, but the large intestine was collapsed. The appendix was normal. The liver was enlarged, of a deep maroon colour, and its lower surface was smooth. The gall bladder appeared normal and bile could be seen in its interior through its translucent wall. As the intestinal obstruction was evidently due to paresis of the bowel, secondary to a grave toxaemia probably of hepatic origin, the abdomen was closed.

Necropsy.

The child died twelve hours later, and at the autopsy the same general condition of the abdomen was observed, but on cutting through the ligamentum teres to remove the liver pus poured from the umbilical vein, which was widely distended (to three-eighths of an inch). On exposing the liver its upper surface showed a number of whitish areas which on section corresponded to small abscesses within the liver substance. The liver was enlarged and between the infected areas was intensely engorged with blood. There were a number of small haemorrhagic spots scattered throughout the lungs, but no evidence of abscess formation in any other viscera or in the brain could be detected. The lower part of the rectum and the anal canal were much congested and swollen and doubtless accounted for the passage of blood and mucus.

It is highly probable that infection took place in a clot in the umbilical vein and spread to the liver. That the navel should have healed soundly when the intra-abdominal part of the umbilical vein was full of pus is somewhat remarkable. The symptoms from which the child suffered are easily explained by the condition of the liver found at autopsy.

I am greatly indebted to Mr. Cairns Forsyth for permission to report the case.

EXCISION OF THE FIBULA IN AMPUTATIONS BELOW THE KNEE-JOINT.

BY

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SERVICEABLE stumps after amputations of the lower extremity must possess good movement, be painless, and able to sustain the direct pressure of a part of the body weight upon the artificial limb. Without these attributes it is practically impossible to fit an absolutely satisfactory artificial limb. Much time and money are often wasted in making and attempting to fit artificial limb after artificial limb to unsatisfactory stumps, whereas correct operative treatment before fitting the artificial limb might have saved much time and trouble both to the artificial-limb maker and the patient.

During the last five or six years a great deal has been learned about amputations, amputation stumps, and the fitting of artificial limbs. Some amputations which were before the war considered "first class" have been of late unable to stand the tests to which they have been subjected. There are still probably many amputation cases in the country which require operative treatment before they can be fitted with really satisfactory artificial limbs. Many below-knee amputation stumps which are at present painful and unsound can be transformed into serviceable stumps by excision of the remaining part of the fibula and removal of that part of the external popliteal nerve which lies below the level of the knee-joint.

In a considerable number of cases of amputation below the knee-joint the presence of the fibula appears to cause considerable difficulty in fitting and wearing a satisfactory artificial limb. This difficulty is more especially noticeable in stumps where atrophy of the muscles covering the bones has been excessive. It is well known that structures that do not exert their normal function undergo atrophy, particularly muscles and bones, so that it is easy to explain the excessive atrophy often seen in amputation stumps. It is in these cases especially where atrophy has been excessive and in which pressure on the prominent head of the fibula causes pain, that removal of the bone improves the condition and produces serviceable stumps.

Although the removal of the fibula has been practised by a few surgeons it does not appear to have received the consideration due to it, taking into account the benefit which is likely to be derived from its practice. The textbooks of surgery scarcely make any mention of the procedure. Muirhead Little in his recent book on *Amputations and Amputation Stumps* (Chapter II, p. 39) refers to the procedure as follows:

> "When the amputation is below the knee excision of all that remains of the fibula will add to the amount of skin available, and sometimes enable the surgeon to cover the tibia satisfactorily without shortening it."

In *Orthopaedic Surgery of Injuries*, edited by Sir Robert Jones (vol. 1, p. 478), there is the following reference to excision of the fibula in amputation below the knee:

> "In these short stumps there is a tendency for the fibula to tilt away from the tibia and project. In these cases it is a good plan to remove the fibula. In this way a piece of bone is removed which stands pressure badly, and at the same time the bulk of the stump is diminished, so that a flap which would otherwise be too small may suffice."

A man with a serviceable stump, fitted with a satisfactory artificial limb below the knee, is often able to earn his living at a laborious occupation which may necessitate him standing for many hours a day and walking long distances in the performance of his duties. The following cases, taken from a large series of amputations which have come under my care during the last five or six years, will illustrate how excision of the fibula has been the means of obtaining serviceable and satisfactory stumps.

CASE I.—*Gunshot Wound of Right Leg: Amputation below the Knee: Re-amputation below Knee with Excision of the Fibula. Result, Serviceable Stump.*

J. A., a professional golfer, aged 28, was wounded in the right leg on March 16th, 1916, while serving in France; the leg was amputated, and he was transferred to England on April 6th.

Examination (May 1st, 1916).—General condition good. Local condition: The right leg has been amputated below the knee by the guillotine method. The extremity of the stump is covered by a healthy granulating area.

Re-amputation May 5th, 1916. The fibula was excised and flaps were dissected from the anterior and posterior aspects of the amputation stump; the anterior and posterior tibial nerves were cut short and the flaps brought together with as little tension as possible. Four months later the stump was soundly healed. He was fitted with an artificial limb in December, 1916, and the following May he was able to walk and stand with ease and comfort and could play a round of golf over a course of eighteen holes. In this case without removal of the fibula it would have been impossible to cover the ends of the stump with a satisfactory skin flap. Removal of the fibula enabled a satisfactory stump to be obtained below the knee-joint, and a limb could be fitted which gave the patient full use of the knee.

CASE II.—*Gunshot Wound of Right Leg: Amputation below the Knee with Excision of the Fibula. Result, Serviceable Stump.*

A. G., a fish curer, aged 25, was wounded in the right leg in May, 1916. The leg was amputated by the guillotine method, and he was transferred to England. The stump below the knee measured 2½ inches, and its extremity was covered by a layer of healthy granulation. Three months after the primary amputation a second amputation was done: the fibula was excised, the external and posterior popliteal nerve dissected out and cut as short as possible, and skin flaps were freed and brought over the stump with as little tension as possible. In six months' time the stump was completely healed and ready for fitting with an artificial limb. The patient was given his first limb in January, 1917, and his second limb in September, 1919. He has returned to his previous occupation as fish curer, and can walk two miles to his work, stand all day, and has no pain or discomfort in the stump.

CASE III.—*Gunshot Wound of Left Leg: Amputation below the Knee: Painful Stump, Unable to Bear an Artificial Limb: Re-amputation with Excision of Fibula. Recovery with a Serviceable Stump.*

H. M., aged 38, was first seen in March, 1922, when he gave the following account of himself. He joined the army in 1915, and served in France until he was wounded in the left leg in November, 1916. He passed through the various hospitals in France and was finally transferred to England and was admitted to a hospital in Sheffield, where his leg was amputated; the amputation was followed by two re-amputations to prepare the stump for the fitting of an artificial limb. He was fitted with his first artificial limb in March, 1917, and with his second in 1920. He states that neither limb has ever been satisfactory. He could at the best only wear the limb for three or four hours a day, and could only walk about half a mile with difficulty. At various times, owing to the pain and swelling, he has been compelled to leave off the artificial limb and take to crutches for two or three weeks at a time.

Examination.—A healthy-looking man; the left leg has been amputated and he walks with difficulty on an artificial limb. Local condition: The left leg has been amputated below the knee. The stump measures 4 inches in length. The soft tissues covering the stump are redundant. The fibula is prominent and pressure over the head of the bone causes much pain.

Removal of the remaining part of the fibula with the redundant soft tissues was advised. The operation was performed under chloroform on March 14th, 1922. A vertical incision was made over the outer aspect of the stump, the incision being a quarter of an inch behind the fibula and carried downwards over the lower end of the stump. The external popliteal nerve was exposed, dissected free, and after crushing as high as possible with strong lever compression clamps divided through the crushed area and allowed to retract. The fibula was then removed subperiosteally and the redundant tissues at the extremity of the flaps removed. A few bleeding points were ligatured, the skin sutured, and a firm gauze bandage applied. The stitches were removed on the seventh day, and the patient allowed to get up at the end of two weeks. In order to prevent the swelling of the stump which so often happens in cases of amputation and re-amputation a light plaster-of-Paris bandage was applied to the stump over a small dressing. It has been found that this procedure effectively prevents swelling of the stump, lessens pain, and allows the early application of an artificial limb.

This patient was fitted with an artificial limb early in May; he rapidly got used to the limb, and he has had no pain or difficulty in wearing it since the operation of removal of the fibula, and now, four months after the operation, he can wear the limb all day and walk four or five miles without difficulty or pain.

CASE IV.—*Gunshot Wound of Right Leg: Amputation below Knee: Painful Stump, Unable to Wear Artificial Limb: Re-amputation with Excision of the Fibula. Serviceable Stump.*

J. S., aged 42, was first seen in April, 1922, when he complained of a painful stump and inability to wear his artificial limb. He gave the following account of himself. The left leg was amputated below the knee in April, 1918; an attempt was made to fit him with an artificial limb in December, 1918, and he was supplied with a second limb in 1919. He has never been able to get about with any comfort and many attempts have been made to try and fit him with an artificial limb, without any permanent success. He has never been able to walk more than half a mile, and the stump was always painful.

Examination.—General condition good. Local condition: The right leg has been amputated below the knee; the stump measures 3½ inches. The tissues covering the extremity of the stump are adherent to the bones. The fibula is prominent, especially at its lower end, where it is thickened and projects and appears to be tilted away from the tibia. Pressure over the fibula is painful.

Removal of the fibula was advised. The operation was done in May, 1922; the fibula was removed and the adherent scar freed from the bone. The patient was refitted with an artificial limb in June, and since then he has had little or no pain, and has been able to wear an artificial limb with much more comfort.

CASE V.—*Gunshot Wound of Right Leg: Amputation below Knee: Painful Stump, Unable to Wear Artificial Limb with Comfort: Excision of Remaining Part of Fibula. Result, Serviceable Stump.*

F. E., aged 26, was wounded in the right leg in 1917. The leg was amputated below the knee, leaving a stump 3 inches in length. An artificial limb was fitted in 1918, and he was supplied with a second limb in 1919. He states that he has made good use of the artificial limbs, wearing them all day and walking with comfort until about six months ago, when he began to have pain in the stump and experienced difficulty in wearing the limb.

Examination (July, 1922).—Local condition: The right leg has been amputated below the knee-joint; the stump measures 3 inches in length. There is some wasting of the tissues covering the stump, but the tibia is well covered. The fibula, which has been divided on a higher level than the tibia, projects on the outer aspect of the stump; the scar is adherent to it, and there is a small bursa over the bone. Pressure over the fibula causes pain.

Excision of the remaining part of the fibula was advised. The operation was done on August 9th. The wound healed well and the artificial limb was fitted three weeks later. The patient now walks well and is free from pain.

CASE VI.—*Gunshot Wound of Left Leg: Amputation below the Knee; Painful Stump, Unable to Wear Artificial Limb: Excision of Remaining Part of Fibula. Result, Serviceable Stump.*

W. D., aged 26, was wounded in the left leg in 1917. The left leg was amputated below the knee. He complains that, although fitted with artificial limbs which he has been able to wear, he has never been really comfortable for any length of time. He considers that the artificial limbs with which he has been supplied fit well and that it is the pain in the stump which prevents him from wearing them.

Examination.—The left leg has been amputated below the knee. The stump measures 4 inches in length; the fibula is unduly prominent and the muscles covering the stump are wasted. The scar is adherent to the tibia.

Removal of the fibula with freeing of the adherent scar was advised. The operation was willingly agreed to and was performed on March 26th, 1922. The wound healed by first intention, and five weeks later the patient was fitted with an artificial limb. The stump was now painless, with a result that he could walk and stand with comfort.

Removal of the fibula adds so much to the efficiency of stumps after amputation below the knee that I think it is an advantage to perform it in all cases in which the stump will not measure more than four inches.

BRONCHIECTASIS WITH UNUSUAL COMPLICATIONS.

BY

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IN the issue of the BRITISH MEDICAL JOURNAL for June 5th, 1920 (p. 767), I referred briefly to two instances of certain complications of bronchiectasis which apparently had not been recorded up to that time, and which can now be described in more detail, as the second case terminated recently.

CASE I.

The first case was one of bronchiectasis in a man of 46, of pneumonic and pleurogenous origin, in which the accessory nasal sinuses became infected in turn, requiring operation for empyema of the antra of Highmore. The fetid pus from the pulmonary cavities was often expelled in quantity and projected suddenly with much force into the mouth and nose, and infection of the accessory sinuses arose in this way. The patient frequently complained of severe frontal headache, which probably resulted from a chronic inflammatory state of the mucosa of the frontal sinus. Severe attacks of haemoptysis occurred from time to time, and death took place after fourteen years from pneumonia and gangrene of the lung.

CASE II.

The second case was that of a man, aged 59, of vigorous build and sound health up to the time of an attack of pneumonia and pleurisy seven years previously, after which time he suffered from a chronic cough, profuse purulent expectoration, and gradual failure of health. He was able to hold a responsible position, which necessitated much travelling, in connexion with a railway, to within a month or so of death.

He had several attacks of pleurisy (and probably pneumonia) during the course of the disease, which he always attributed to a chill. He was thus susceptible to the septic complications of the disease from the nature of his vocation. The exact situation of the multiple lesions of the disease was indefinite, probably owing to the associated fibrosis and emphysema of the lungs and

to pleural adhesions over the lower lobes. The main lesions appeared to be in the upper and lower lobes of the right lung. The sputum was examined on several occasions for tubercle bacilli, with negative results. He had never suffered from syphilis, and the Wassermann reaction was negative. He indulged very moderately in alcoholic beverages and tobacco. The disease lasted for close on ten years, when death took place from bronchopneumonia.

The complications which chiefly deserve notice were a condition of chronic glossitis, and a persistent severe albuminuria from chronic nephritis, both of which were probably of toxic origin from chronic infection.

The patient was seen regularly over a period of three years up to the time of the termination. The general state of his health and nutrition was fairly well maintained, despite the secretion of a fair amount of purulent sputum daily and the presence of well marked albuminuria. There was a slight degree of cyanosis with but slight clubbing of the fingers. His tongue from the time when he was first seen was large, red, and unhealthy-looking, being deeply fissured. After coughing, and even on lightly wiping the tongue, the fissures were occupied and filled by expectorated purulent material. A condition of chronic glossitis undoubtedly arose from direct contact with the pus expelled from the lungs, and, despite careful cleansing with antiseptics, the tongue remained enlarged and chronically inflamed, with but slight inconvenience in the form of some local discomfort. There was no undue arteriosclerosis, no cardiac hypertrophy, and the systolic blood pressure never rose above 160 mm. The fundus oculi was normal. No oedema was observed.

The urine was examined on several occasions by Dr. R. L. Mackenzie Wallis of St. Bartholomew's Hospital, with the following results: The colour was pale. The quantity throughout was only a little in excess of normal and was well maintained up to the time of death. The reaction was acid. The specific gravity declined from 1020 in the earlier reports to 1014 a few weeks before death. The albuminuria was considerable and varied from 0.35 gram per cent. (Aufrecht) to 0.75 gram per cent. shortly before death. Globulin was usually present in too small a quantity for accurate estimation, but was approximately 0.05 gram per cent. on one occasion, and the ratio of albumin to globulin was about 8 : 1, which figures agree closely with those found in ordinary nephritis. Sugar, blood, acetone bodies, and urobilin were absent. Indican was present, from a trace in the earlier stages to a strongly positive reaction in the terminal stages of the disease. The total acidity was from 52.4 per cent. N/10 NaOH to 47 2 per cent. N/10 NaOH. Ammonia was present, from 0.05 gram per cent. to 0.03 per cent. The urea concentration test after the administration of 15 grams of urea gave a figure of 1.4 per cent. urea, whereas the urine a few weeks before death contained 2.1 per cent. urea, on a fairly liberal diet. The diastase content was usually 5 units, but was 10 units in 1921, six months before death. Microscopically, pus cells were present in fair number in the earlier stages, but became fewer in the later stages. Red blood cells were absent. Epithelial cells were usually present. The casts were generally of the granular and hyaline variety, and no epithelial and fatty casts were found at any time.

The low urea concentration and the low diastase figures in the earlier stages suggested renal inefficiency, but later examinations did not confirm this view, and shortly before death the urea percentage was normal. Blood urea tests were not performed. There was no evidence of uraemia or of its minor manifestations, so that the kidneys were probably not seriously affected despite the severe degree of albuminuria. The renal condition was probably one of toxic nephritis from septic absorption, for there was no evidence of lardaceous disease of any other organ, such as the liver, spleen, or intestines. The characters of the urine were more those of nephritis than of lardaceous disease, more especially in the absence of polyuria and of a urine of low specific gravity. No other septic complications occurred, and haemoptysis was absent throughout. No *post-mortem* examination was made.

I am indebted to Dr. Mackenzie Wallis for his reports, and to Dr. B. Barnard of Machen, Mon., for valuable information in the case of the second patient.

THE tenth congress of French-speaking anatomists and histologists will be held at Lyons from March 25th to 29th, under the presidency of M. Lesbre, professor at the Lyons Veterinary School.

THE second International Congress of Comparative Pathology will be held at Rome from October 7th to 14th. Medical men, veterinary surgeons, botanists, and biologists who propose to attend should communicate with the President of the Congress, Professor E. Perroncito, 40, Corso Valentino, Turin.

THE eighth French Medico-Legal Congress will be held in Paris from May 24th to 26th, under the presidency of Professor Parisot of Nancy. A discussion on international legislation to control the sale of cocaine will be introduced by Professor Courtois-Suffit. Injuries of the vertebral column by industrial accidents and the law of industrial diseases will also be discussed.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

A CASE OF ADDER BITE.

I HAVE written out these notes at the suggestion of Sir Thomas Oliver, whose paper on adder bite was published in the BRITISH MEDICAL JOURNAL of December 9th, 1922 (p. 1114).

A boy aged 6 was brought to my house at Helston, Cornwall, in the autumn of a year between 1906 and 1910. While picking blackberries he had been struck by an adder at a point half-way between the base of the nail and the last joint of the right index finger. He walked half a mile home, was dressed in his Sunday clothes, and walked again to the station about half a mile away; then came four miles by train, and walked another half-mile down to my house. During the latter part of the journey he was exceedingly sick. My waiting-room was full, and it was not till he had been in the house half an hour or so that I was told a child had fainted. When I saw him—some two and a half or three hours after the bite—he was lying on the floor, blanched and sweating profusely and practically pulseless. With an injection of strychnine, hot bottles, etc., he gradually revived, and after he had had a stiff glass of brandy and milk I was able to put him in my car and drive him home. Two tiny punctures were just visible at the time of my first examination. By the time he reached home the arm was swollen and he was semi-conscious, and moaning with pain. Hot fomentations from hand to shoulder seemed to relieve this somewhat. The semi-conscious condition lasted about two days.

The morning after the bite, when the late Dr. Edward Permewan of Redruth saw the child with me, the right arm was swollen to the size of his thigh, the skin deeply mottled with all the colours of the rainbow, the swelling and discoloration extending half across the chest in front. Next day the discoloration extended across the chest back and front, and down the left arm to the elbow. There was some swelling of the root of the neck, but not enough to cause any difficulty in swallowing. The limitation of the discoloration was most marked. It did not extend to the neck, and was bounded below by a line drawn round the chest at the level of the lower part of the axilla.

From that time the child gradually improved, the swelling and colour dying down, and in about a fortnight he was quite restored to health.

Owing to the length of time that had elapsed before I saw him, local treatment was useless, but as a matter of precaution I incised the punctures and rubbed in some disinfectant, I think potassium permanganate. The child was so collapsed when I first saw him that I did not expect him to rally, and he must have had an exceedingly narrow escape from death.

The case impressed itself very deeply on my memory, and, though my original notes are lost, the above account is substantially correct as to the time when the various symptoms appeared.

In spite of the large number of adders to be found in Cornwall, this was the only case I heard of where a human being was bitten. I was told that when a lane was being cut through the gorse on a moor near Helston to make a 500-yards shooting range, 160 adders were killed. I asked a farmer once to get me some specimens, and he brought in five which he killed in a few minutes on the sunny side of a hedge one April morning. Personally, I had three very narrow escapes from being bitten when shooting and fishing, while my son has twice been struck on the boot. Hounds hunting at the end of the season, when the adders were sunning themselves after emerging from their winter torpor, were frequently bitten, but I believe always recovered. A terrier of mine was bitten under the jaw. The neck and face swelled up very much and the dog was unable to open its mouth for some days, and had to be fed on milk and brandy with a teaspoon. Except for deafness on the injured side, there was no after-effect. Years ago a nephew of mine, when in the *Britannia*, picked up an adder while ashore, and put it in his pocket and forgot it. Later on he put his hand in his pocket to see if the beast was still there, and was bitten on the ball of the thumb. I know no details, but remember that the boy was exceedingly ill and his people had to be sent for.

Norwich. MARK R. TAYLOR.

TRIANGULAR FRONTAL HYPERAEMIA IN INFANTS.

CERTAIN infants and young children display a phenomenon which has not, I believe, hitherto been noted in medical literature. It consists of a triangular area of hyperaemia situated over the juncture of the two frontal bones and extending from the anterior fontanelle above to the nasion

below—the base of the triangle being above and the apex, which is usually blunted or irregular in outline, being below. The width of the triangle varies, but across its centre it averages from three-quarters to one inch. The area is usually punctate in appearance, and at birth is of a bright red colour, the latter gradually fading as time goes on, to become eventually just a faint blush before finally disappearing altogether at or about the end of the second year. Occasionally the macules—which are not elevated—are replaced by streaks, and the colour may be deep enough to border on purple, and so set up the impression in the minds of the parents that the child has a birth mark, but I have never known one of these patches to remain visible for very long after the end of the second year. In some instances the colour is faint at the outset and disappears entirely in a month or two.

This peculiarity has been noted in both sexes and in dark as well as in fair children; it is comparatively common—2 out of 41 children examined on one day, and 3 out of 66 examined on another day, showing it; and it appears to be of academic interest only, no practical difference having been noted between those children who show it and those who do not.

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Maternity and Child Welfare Medical Officer,
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Reports of Societies.

DISRUPTIVE PHENOMENA IN GUNSHOT INJURIES.

A MEETING of the Pathological Section of the Royal Society of Medicine was held on February 20th, with Professor LEDINGHAM, the President, in the chair, when Professor S. G. SHATTOCK read a paper on the disruptive phenomena in gunshot injuries and their physics.

Professor Shattock observed that whatever clinical peculiarities gunshot injuries presented, their proper pathological interest, as injuries only, was limited to the fact that the velocity of the missiles produced special effects known as explosive, or better as disruptive. As was well known, Professor Vernon Boys some years ago succeeded in photographing bullets soon after their leaving the rifle, and demonstrated the presence of a conical air wave accompanying the missile. At first the displacement of air seemed of some importance, but it was quite negligible, although under the name of "windage" much had once been attributed to it. Amongst other proofs the speaker had found that, on firing with a service rifle and pointed modern British bullet, at 20 feet, through screens of tissue paper tensely stretched on wooden frames, the aperture in the paper very little exceeded the diameter of the missile.

The late Sir Victor Horsley attributed the disruptive effect chiefly to the factor of the spin of the bullet. A close study of the casts made from the cavities produced in soft clay by firing directly and at close range into the latter did not, in the speaker's opinion, confirm the evidence of this; the ridges on such casts presented only slight indications of any obliquity, and not more than due to the open spiral of the rifling. The most conclusive proof of the absence of spin was furnished by the study of British bullets fired into sand: the apex showed fine scratches due to the sand, which were not spiral but longitudinal. The disruptive factor was thus reduced to that of forward velocity acting upon a mobile and practically incompressible medium, the lung alone being excepted, in which no such disruption took place owing to the compressibility and ready escape of its contained air. The lateral disruptive movement was imparted to the medium by the intense compression in front of the bullet, which compression was also exerted more directly sideways by the conical point simultaneously acting as a wedge. It was in the skull that the disruptive phenomenon was most marked. The effect was still often supposed to be hydrostatic, but it was a hydrodynamic one, as shown by experiments made upon objects provided with a free exit—upon tins empty and others filled with water freely open at the top: two clear circular holes were made in the first; in the others the back was split into large triangular everted flaps. The rate of the wave transmitted by the incompressible water was equal to that of the bullet, which, as soon as it impinged, was accompanied by the receding wave of the water. Similar results were obtained in human and in sheep skulls when inverted and filled with water; if the brain were left *in situ* in the inverted skull the same comminution took place.

It had been asserted, by Professor Stargardt in 1914, that the British rifle bullet was designed for expansion; that, on striking, the momentum carried the leaden core over the aluminium cone, and split the mantle. A study of bullets fired experimentally through calvariae of different thicknesses, the bullets being recovered in cotton waste behind, showed that on perforating dense bone the momentum on impact caused the lead to splay out or mushroom at the open base, and not at the junction of the lead and aluminium. In the first degree the mantle was evenly turned back over a projecting rim of the lead; in the later the mantle was split and turned out or recurved, like the sepals of a fuchsia, the splitting starting at times when scored by the rifling. On compressing bullets in a vice some of the lead was expressed from the open base, but no displacement occurred over the harder aluminium cone. The cupro-nickel mantle of the British bullet, however, was less resistant than the German, of steel. This the speaker was able to show by taking equal lengths of the two, placing a steel ball over the open end, and testing by increasing loads the pressure they would withstand. The British mantle began to yield or open out under a load of 180 lb.; the German, under a load of 390 lb.

The Fermentative Reactions of B. diphtheriae.

Dr. C. C. OKELL and Miss E. M. BAXTER read a paper on the fermentative reactions of *B. diphtheriae*. They had examined the fermentative reactions of the serological types of virulent *B. diphtheriae* described by Eagleton and Baxter, as well as their unclassified cultures. The most useful agents for differentiating the *B. diphtheriae* appeared to be glucose, saccharose, lactose, dextrin, glycerin, and litmus milk, and glucose and saccharose appeared to be the sugars of most practical use in differentiating the diphtherial from the diphtheroid groups. All the serological types of virulent *B. diphtheriae* so far examined had practically identical sugar reactions. Fermentative reactions at present available could not be used to distinguish between the various serological types or between virulent and avirulent forms.

The Inheritance of the Specific Iso-agglutinable Substances of the Red Blood Cells.

Dr. S. C. DYKE communicated the results of an investigation undertaken by Dr. C. H. Budge and himself in the maternity ward of St. Thomas's Hospital into the inheritance of the specific iso-agglutinable substances of the red blood cells. Ninety-seven unions were observed with 98 offspring. In no case was it found that the iso-agglutinable substances A or B of the red cells appeared in the offspring without having been previously present in the blood of the parents, this being in conformance with the hypothesis of von Dungern and Hirschfeld. Placental blood was used for ascertaining the blood group of the infants; it was found that in only 16 out of the 98 cases investigated was it possible to allot the placental blood to its group by means of the agglutinins of the serum; in the remaining 82 the agglutinins were either completely or partly absent. In determining the group of the offspring reliance was consequently placed upon the reaction of the red cells. It was pointed out that 32 of the 98 babies examined appeared to be of a different group from their mothers.

Carcinoma of the Skin in Rabbits.

Dr. J. A. MURRAY showed preparations of two squamous-celled carcinomata of the skin which he had produced in rabbits as the result of eight months' painting with an ethereal extract of tar. The latent period of the development of those tumours corresponded fairly closely with that seen in the mouse. Dr. Murray said that they were likely to prove of great value in the investigation of therapeutic measures, for the rabbit was a particularly favourable animal for that purpose.

PRIMARY UNION IN SUPRAPUBIC OPERATIONS.

A MEETING of the Urological Section of the Royal Society of Medicine was held on February 22nd, with Sir JOHN THOMSON-WALKER in the chair. Mr. RALPH THOMPSON read a paper on the propriety of attempting primary union in cases of suprapubic operations on the bladder and prostate.

Mr. Thompson first described in some detail thirty-one cases in which he had performed primary union after suprapubic cystotomy, and which he classified under the seven following

headings: simple adenoma of the prostate, malignant disease of the prostate, simple adenoma of the prostate with calculi, growths of the bladder, vesical calculi, retrograde catheterization, and exploration. In seven of the thirty-one operations there followed slight leakage. Mr. Thompson was careful to emphasize that by leakage he meant some damping of the dressing and not suppuration. In twenty cases there was no leakage. Four died, one certainly from causes unconnected with the operation. The average post-operative stay in hospital in cases of simple adenoma of the prostate with primary union was twenty-nine days. The average stay in Guy's Hospital of ten non-selected cases (apart from fistula), in which the wound was left open was 45½ days. He suggested that the closing of the wound caused a much shorter convalescence. In none of his cases was there a fistula persisting after ten days. The dressing bill was materially lessened. In malignant cases there was no post-operative spread of the growth to the skin. He thought that in certain cases primary union should not be attempted. Amongst these were some which involved a wound in the base of the bladder, excluding prostatectomy; cases of rough spiky calculi and a large prostate; cases where the pulse was not good enough to make reactionary haemorrhage improbable; and, naturally, cases with cystitis or uraemia.

Mr. Thompson then described the steps of his operation. He thought that, in spite of anatomical textbooks, the peritoneum appeared in front and at the sides of the distended bladder. He made a transverse incision through the bladder wall. Deep chloroform was the anaesthetic of choice. He invited discussion on the question of preliminary distension of the bladder and of the use of the retractor in bladder surgery. He did not use one himself, preferring to bring the growth to him rather than to operate in the depths of a deep and dark pit. He believed it right to attempt primary union in suitable cases because of the comfort of the patient, the shorter convalescence, and the more normal anatomical result. Moreover, he thought that the surgeon probably took more care over the operation if he knew he was about to suture the viscus.

Mr. NITCH approved the method, but emphasized the danger of haemorrhage in the closed organ. He believed the indwelling catheter led to epididymitis. The transverse incision gave more room, but every case should be treated on its own merits.

Mr. MORSON did not agree with the method in any case in which degenerative changes of the urinary tract were present. Degeneration meant an increased risk of sepsis.

Mr. JOCELYN SWAN preferred to drain. In his experience most cases sutured after prostatectomy had to be reopened for drainage. He did not think convalescence was much shortened. Usually by the old method the wound was healed in seventeen days and the patient was able to leave hospital seven days later. He used the retractor. He believed that often the growth could not be drawn up in the way Mr. Thompson had suggested.

Mr. MACALPINE liked to close the bladder in three layers, and suggested a method of maintaining the indwelling catheter in position by transfixion of penis, urethra, and catheter. He suggested the treatment of epididymitis by atropine.

Sir JOHN THOMSON-WALKER did not think primary suture made convalescence much shorter, but there was certainly less chance of hernia. Moreover, sepsis was often introduced along a drainage tube; and this was, in primary union, prevented. On the other hand, drainage was not so easy with a catheter as with a tube, and there might therefore be more danger of an ascending infection.

Mr. THOMPSON briefly replied and the discussion closed.

Mr. R. OGIER WARD described a remarkable case of air embolism occurring in the course of urethroscopy. The patient was a male, aged 68. Consequent upon gonorrhoea forty years previously he suffered from a stricture in the urethral bulb. During aero-urethroscopy, in which slight bleeding occurred and in which rather more than usual air pressure was necessary, the patient suddenly became dyspnoeic, cyanosed, convulsed, and died. Cardiac massage failed to revive him. The heart could be felt to contain air, and froth issued from the right ventricle when it was later incised. *Post mortem* all the chambers of the heart contained frothy blood. Bubbles of gas were found in the aorta, common iliac arteries, the pulmonary vein, inferior vena cava, and other vessels. No froth was discovered in the pulmonary artery. The case was exceedingly interesting, since it demonstrated the danger of aero-urethroscopy with laceration of the mucous membrane of the urethra and a tight stricture preventing the escape of air into the bladder. Mr. Ogier Ward suggested that the employment of oxygen might give a greater margin of safety.

Sir BERNARD H. SPILSBURY said that in his experience the danger of air embolism depended on the size of the vein and its proximity to the heart. Doubtless small air emboli were quite common. Perhaps the right auricular appendage might serve, in the recumbent position of the body, as a safe receptacle for such air during absorption.

SUBACUTE INFECTIVE ENDOCARDITIS.

AT a meeting of the Cardiff Medical Society held on February 13th, with the President, Professor E. J. MACLEAN, in the chair, Dr. IVOR J. DAVIES read a paper on subacute infective endocarditis based upon a report of eight cases. The term was applied to cases of old endocarditis with an added subacute infective process of streptococcal origin. There had been an apparent increase in the disease recently.

Clinical data were submitted in support of Poynton's view that no hard and fast line could be drawn between simple endocarditis and infective endocarditis. In four cases an arthritis of the larger joints was present, indistinguishable from that of subacute rheumatism. In one of these cases the *post-mortem* appearances resembled those of simple endocarditis, except that there was an extension of the morbid process to the wall of the left auricle. The clinical picture was described as briefly that of a case of valvular disease, usually aortic in the case of ex-service men, with certain general signs and symptoms added to those of the mechanical cardiac disability. These were grouped under two heads: (1) toxic; (2) embolic. The former included a low grade of irregular, remittent fever, which might be absent for days or weeks. A chart was shown in which the temperature was normal for a period of five weeks except for two elevations to 101° and 100°, separated by an interval of eighteen days, after which the typical low irregular fever was resumed. The onset of pallor, particularly in a case of aortic regurgitation, was emphasized as an early indication of a general infective process, which was also disclosed through loss of flesh and strength. Enlargement of the spleen was perhaps the most valuable early sign indicating that a general infective process had been added to the old condition of valvular disease. Clubbing of the fingers, too, occurred early in the disease. The embolic signs shown by the eight cases included petechiae, a papular and nodular eruption, mycotic aneurysms of the femoral and brachial arteries, intermittent albuminuria, and haematuria. The duration varied from three months to two years, and was on an average twelve months. The extension of the morbid process from the mitral to the aortic valve was observed in one instance. The mitral valve was badly affected on admission, the aortic valve being apparently normal, as the sound of its closure was clear and sharp. The second sound then became indistinct, later a bruit or squeak appeared, and afterwards a musical diastolic murmur was audible up to the time of death. Necropsy showed one cusp of the aortic valve badly affected, being almost entirely destroyed and replaced by vegetations, one of which was sessile and, during life, gave rise to the musical murmur. The inner end of the third left space was described as the optimum point in auscultation for evidence of early aortic incompetence, as was to be expected from the regional anatomy of the valve. Vaccine and serum therapy, as in other forms of septicaemia, appeared to be the most promising line of treatment. Death occurred from heart failure, except in two cases in which acute uraemia was the final event. In diagnosis the general disturbance, clubbing of the fingers, and enlargement of the spleen were the important early signs of the disease. A daily examination of the urine, particularly of the deposit, for blood cells would sooner or later show that embolism has occurred. Blood culture might show the streptococcus, and if negative from venipuncture, then a little blood could be withdrawn from the spleen for cultural examination.

Dr. R. PRICHARD stated that in his experience of subacute infective endocarditis there had been, in most of his cases, an antecedent history of rheumatism. He was of opinion that an infection of intestinal origin played an important part in the subsequent development of the condition; he had

frequently noted the presence of tympanitis and general atony of the bowel, and he had succeeded in obtaining temporary improvement of the cardiac state following the administration of intestinal antiseptics. In one case the etiological factor of pyorrhoea alveolaris was strikingly demonstrated; removal of the teeth was followed by relief of the valvular symptoms, and the man's condition so improved that at the end of six months he was sent back fit for light duty.

The PRESIDENT asked if the condition occurred more frequently in one sex than the other, and if auricular fibrillation had been present in any of the cases.

Dr. H. A. HAIG's contribution to the discussion was based on the *post-mortem* examination of 30 cases seen at a pensions hospital during 1920–21. The majority showed a streptococcal infection of either the aortic valve or the aortic and mitral valves together. In a few cases *S. haemolyticus* had been proved by blood culture to be present during life. Regarding antecedent conditions in the heart valves, especially the aortic, the question of a specific history was raised. Throughout the series of cases the kidneys were the seat of lesions referable, he considered, to the slowly acting toxaemia directly connected with the infective process. The lesions took the form of (*a*) a diffuse interstitial fibrosis, associated with hyaline change in partially and completely fibrosed glomeruli, and thickening of the intima and sometimes of the media of the smaller arteries; (*b*) collections of lymphocytes both immediately under the capsule and in the cortex; (*c*) at times an advanced degeneration of the epithelium lining the convoluted tubules; sometimes dilatation of the tubules had occurred with desquamation of the lining epithelium. (*d*) Small subcapsular haemorrhages, and an engorgement of the renal vessels generally; the subcapsular haemorrhages appeared to be of the nature of small multiple infarctions. These changes did not occur together in the same kidney, sometimes one type, sometimes another, being predominant. There was a possibility, he agreed, that some of the changes, especially in the glomeruli, were due to an antecedent attack of trench nephritis; on the other hand, the evidence of recent mischief pointed directly to the involvement of the kidneys in the general process. He mentioned the further possibility of war wounds having acted as portals of entry for the systemic streptococcal invasion.

Dr. HERBERT EVANS related a case of subacute infective endocarditis where he had been able, also, to trace the secondary involvement of the aortic valve from the mitral. He quoted Cotton to the effect that the earliest manifestations of petechiae were to be noted under the finger-nails and in the subpalpebral conjunctiva.

Dr. IVOR DAVIES, in reply, agreed with Dr. Prichard in regard to the value of treating any coexisting alimentary intoxication. He assured the President that the condition was equally common in both sexes, and that auricular fibrillation was an infrequent event. He disagreed with Dr. Haig regarding the renal lesions, being of opinion that diffuse nephritis occurred in acute infective endocarditis rather than in the subacute variety. Further, he stated that there was no reason for believing that war wounds played any prominent part in the etiology of the latter process, and that although in one of his series of cases the onset of the condition was said to date from a fall, accompanied by superficial abrasions, he was not prepared to admit any etiological significance therefrom.

Unidle Tears.

Mr. J. W. TUDOR THOMAS gave a demonstration, illustrated by cultures, of the bactericidal action of tears. Basing his work on the technique of Fleming, with various modifications, he showed that both fresh and boiled tears killed young cultures of *Sarcina flava* in dilutions of 1 in 1,000. He further showed that heating tears to dryness and redissolving the residue had no effect on their bactericidal properties. Undiluted tears killed *Staphylococcus albus* and inhibited its growth in dilutions of 1 in 40. No bactericidal action was noted in the case of *Bacillus coli*, *Staphylococcus aureus*, *Streptococcus pyogenes*, and *Bacillus pyocyaneus*. It was suggested that in estimating the sterility or otherwise of the conjunctiva the material obtained should be diluted appropriately in order to neutralize its bactericidal action; the latter would appear to be either organic in nature or closely bound up with the albumin molecule in the tears. It was improbable that this was in the nature of an enzyme, since its action remained after boiling.

Lipoma.

Dr. H. SHEASBY showed a boy, 8½ years old, with a large swelling in the right thigh, which first appeared at the age of 2½ years on the outer surface of the middle third of the thigh, and had since got gradually bigger. There was slight pain when the leg was fully flexed. For three months it had been treated as a tuberculous lesion, but aspiration was negative and a skiagram showed no implication of the femur. The general opinion was that the condition was due to a lipoma underlying the quadriceps extensor.

DIPHTHERIA CARRIERS AMONG CHILDREN OF SCHOOL AGE.

AT a meeting of the Medical Officers of Schools Association on February 23rd, Dr. J. GRAHAM FORBES gave an account of investigations on diphtheria carriers among London school children. He mentioned that the prevalence of diphtheria in London during the years 1920–22 had surpassed all previous records, and for any approach to it, it was necessary to go back to the eight-year period 1893–1901. The number of cases began to rise in the second half of 1919, reached its height in the last quarter of 1921, and diminished but little in 1922. The figures for the three years were as follows:

Year.	Total Cases Notified.	Cases of Children of School Age (5 to 15 years).
1920	13,780	6,499
1921	16,319	9,089
1922	15,287	7,352

During each of these years some two hundred or three hundred special visits of inspection were paid to the schools on account of diphtheria alone, and the bacteriological examinations of the throat and nose of children swabbed in the course of these special school visits gave the following results:

Year.	No. of Examinations.	Negative.	Positive.	Suspicious.
1920	5,811	4,740	721	350
1921	6,606	5,541	656	409
1922	5,401	4,543	488	370

The epidemic appeared to have radiated from a focus in the contiguous areas of Stoke Newington, Hackney, and Islington, and in 1922 to have been concentrated in the south-western districts (Battersea and Wandsworth). From April, 1921, the virulence test, as to the value of which the speaker was most emphatic, was applied, and in 553 examinations of carriers (387 children) in which the *B. diphtheriae* was isolated, the cultures proved to be virulent in 343 examinations (260 children) and avirulent in 210 (127 children). The proportion of the virulent carriers to the total number in the case of these school children was, therefore, considerably above the proportion (38.8 per cent.) given in Dr. A. J. Eagleton's series, published in the BRITISH MEDICAL JOURNAL of January 28th, 1922 (p. 139). Of these 387 carriers 243 gave evidence of throat and nose defects, and of those giving such evidence 168 were found to be in the virulent category and 75 in the avirulent. The cases with a previous history of diphtheria numbered 16, and among these the strain was virulent in 12 and avirulent in 4. There was a history of sore throats and colds in 53 cases, of which 35 were virulent and 18 avirulent. Home contacts of diphtheria cases numbered 35 (virulent 25, avirulent 10), and desk contacts at school 19 (virulent 14, avirulent 5). Dr. Forbes regarded the virulence test as extremely useful because under proper precautions those reported avirulent could be readmitted to school, whereas in the absence of such a test they might have remained excluded for months. Some cases had been carrying for as long as three years, and on being found avirulent were readmitted to school, without harmful result. So far as could be ascertained, the organism remained true to its type of virulence or avirulence. It was recognized, however, that virulent and avirulent strains might coexist, and this had, in fact, been found in two cases among the 387 children. Very rarely the strains might alternate, but the risk of the virulent supervening upon the avirulent was probably not greater than the risk of the ordinary person becoming a diphtheria carrier.

The relation of the virulent and avirulent organisms awaited further investigation. It was difficult to dogmatize, and it was difficult also to draw any hard and fast line at which the exclusion of virulent carriers became justifiable or necessary. When diphtheria became prevalent certainly the virulent carrier must become an object of grave suspicion, if not of danger. Exclusion would seem also to be justifiable under certain conditions pertaining to the individual, such as the presence of large numbers of organisms in the culture, or a defective condition of throat and nose. Otherwise, in the case of mild carriers, the middle course of non-exclusion but constant supervision seemed to be possible. Unfortunately, measures of control which were adequate to the schools could not be extended outside, and the carrier might still be a source of danger in kinemas or Sunday schools. Fresh legislation might be desirable on this point, to be enforced at times of diphtheria prevalence. The treatment of the diphtheria carrier in the school had been met partly by the use of the nasal douche or suitable gargles, and partly by the provision of treatment for enlarged tonsils and adenoids. In chronic carriers the removal of tonsils and adenoids was usually effective, but there were exceptions, and he mentioned one case of a child who was a carrier for several years after enucleation of the tonsils. The evidence forthcoming, not only from the bulk of investigations into the school incidence of diphtheria of the recent two or three years, but also from special inquiry on the point in time past, went to show that the part played by the school in the spread of the disease was of quite secondary importance compared with the influence of home and out-of-school sources, which, being more beyond immediate control and supervision, were probably far more responsible for the dissemination of infection. He referred, in conclusion, to prophylaxis and the possibility of future immunization by the adoption of the Schick test on a large scale.

TREATMENT OF FULL-TERM ECTOPIC GESTATION.

A MEETING of the Midland Obstetrical and Gynaecological Society was held at the Royal Infirmary, Leicester, on February 13th, with the President, Dr. PURSLOW, in the chair, when Mr. CECIL MARRIOTT opened a discussion on the treatment of full-term ectopic gestation.

Mr. Marriott referred to a meeting of the Section of Obstetrics and Gynaecology of the Royal Society of Medicine in 1919, when the late Mr. Gordon Ley presented notes of 100 collected cases, from which he showed that the maternal mortality rate was high in cases of early operation, whilst there was risk of infection of the sac if the case was left for long after full term. The mortality amongst babies delivered at the time of false labour was low, and many of these babies (50 per cent.) presented various degrees of deformity. Treatment resolved itself into early or late operation. In early operation the maternal risk from haemorrhage was very great. Although in suitable cases, after primary ligature of all big vessels, the placenta and sac might be removed without severe bleeding, it was probably wiser to marsupialize the sac and leave the placenta to natural absorption. In cases where no effort was made to save the child, operation should be delayed for at least three months, by which time bleeding would be greatly lessened and the operative risks small. Mr. Marriott reported the details of a case operated on by him successfully on those lines, three months after spurious labour.

Mr. FURNEAUX JORDAN referred to one of the earliest cases successfully operated on at term by the late Professor Taylor. Mr. Jordan also reported two cases: One was operated on two years after false labour, and the sac contained only the foetal bones and some dark brown fluid; the other was seen two months after term, and presented no operative difficulties. Dr. H. T. HICKS mentioned a recent case in which he delivered a living but deformed child. Both walls of the uterus and the placenta were encountered and incised before the sac was opened. There was brisk haemorrhage, dealt with by marsupialization of the sac and plugging. In view of the formidable nature of the operation at term and the comparatively small risks of infection, Dr. Hicks strongly favoured the late operation.

Dr. T. C. CLARE mentioned a case operated on two weeks after labour, in which severe haemorrhage was encountered, although no attempt was made to separate the sac and the placenta. Dr. C. D. LOCHRANE reported a case operated on eighteen months after labour; the placental attachment was in the Fallopian tube, and removal presented no difficulties.

Cases and Specimens.

Dr. H. T. HICKS showed microphotographs from a case of endometrioma of the ovary. Both ovaries on removal at operation were found to contain multiple "tarry" cysts. The microphotographs showed numerous glandular spaces in the ovarian stoma lined with cylindrical epithelium. Dr. Hicks considered that the most likely explanation of these cysts was endometrial metastasis. Dr. T. C. CLARE reported three cases of adeno-myoma of the recto-vaginal septum. Dr. C. D. LOCHRANE reported (1) a case of adeno myoma of the recto-vaginal septum showing decidual reaction during normal pregnancy; and (2) a case of adeno-myoma of the uterus in pregnancy showing decidual reaction. The cases were illustrated by lantern slides, microphotographs, and microscopic sections. Dr. Lochrane also showed a specimen of epithelioma of the vulva following leukoplakia. The case was of interest, as when first seen there was no evidence of malignant change, but when seen again after a course of *x*-ray treatment there was an obvious epithelioma with some glandular involvement.

SCIATICA.

AT a meeting of the Buxton Medical Research Society held at the Devonshire Hospital on February 5th Dr. J. B. BURT, in opening a discussion on sciatica, pointed out that sciatica was a symptom and not a disease. It was perhaps the most interesting condition treated at the Devonshire Hospital. He preferred dividing sciatica into trunk sciatica and root sciatica. Primary sciatica was exceedingly rare, and neuritis and neuralgia were merely stages of one condition. The commonest cause of sciatica was fibrositis of the glutei and the fascia covering this region. This was the easiest group to diagnose and to treat. On the other hand, sciatica due to fibrositis of the pyriformis was exceedingly difficult to diagnose and to treat. It might give rise to trunk or root sciatica. Pain on coughing or sneezing was suggestive of pyriformis fibrositis. In Sweden particular attention had been devoted to this cause. Gonorrhoeal fibrositis of the gluteal region must not be forgotten as a fairly common cause of sciatica. Arthritis of the hip-joint accounted for something like 10 per cent. of the cases of sciatica. Sacro-iliac disease was not so common a cause of sciatica as it seemed at first sight. Acute tenderness along the ridge of the sacro-iliac joint occurred in many cases of sciatica where there was no disease of the joint. Inflammation of the bursae around the hip-joint might give rise to very severe sciatica.

Root sciatica was distinguishable from trunk sciatica by (*a*) broad bands of pain extending from the gluteal region along the back and side of the thigh, (*b*) tenderness of the psoas muscle, (*c*) wasting of the leg muscles and glutei, and (*d*) sometimes by the attitude of the patient in walking. Syphilis was an important cause of this condition; it generally gave rise to bilateral sciatica.

Dr. Burt, in emphasizing the importance of diagnosing adhesions, said that the following three points were suggestive of adhesions: (1) a long-continued dull pain extending over a period of months, aggravated by walking and unrelieved by rest; (2) pain starting immediately the patient gets out of bed; (3) the floor sign. To elicit the floor sign the patient sat with his back against the wall with his legs extended straight in front of him. With a sciatic adhesion it was practically impossible to touch the floor with the back of the knee. If the results obtained by other physicians corresponded with his, this test should prove of great clinical value.

X RAYS IN GYNAECOLOGY.

AT a meeting of the London Association of the Medical Women's Federation held at the Elizabeth Garrett Anderson Hospital on February 12th, with Mrs. FLEMMING, M.D., Vice-President, in the chair, a paper was read by the President, Miss LOUISA MARTINDALE, M.D., entitled "Modern technique in the *x*-ray treatment of gynaecological conditions."

Dr. Martindale divided her subject-matter into two parts: First, the treatment of cases by the Freiburg method between 1914 and 1920. During this period Dr. Martindale had treated a large number of cases of uterine fibroids with intensive *x*-ray

therapy and many cases of malignant disease of breast, uterus, and ovary. The results showed that 46 per cent. of all cases of fibroids could be treated by *x* rays alone. In malignant disease Dr. Martindale considered that she got results very much like other people's. Amongst the few brilliant results six cases especially helped her to keep her optimistic views on the value and future of *x*-ray therapy. These cases Dr. Martindale reported in detail. In the second place she discussed modern technique. In August, 1922, she returned to Germany to study the technique that had been developed during the war. There she saw something of the work of Dr. Gauss in Freiburg, and was given opportunities of studying the technique which she had now for the last four months adopted in her own practice. She described how their technique had been revolutionized, one long treatment now taking the place of the split doses of the Freiburg method. The enormous voltages of the new type of coil and transformer, the American Coolidge and German boiling water tubes, together with the heavy filtering employed, have made these intensive doses possible and have improved the results incredibly. Dr. Martindale next went to the Frankfurt General Hospital, where she remained some weeks. She described the beautiful situation and planning of the hospital and the measures taken to safeguard the health of the *x*-ray workers. Here she was able to examine the whole of the work in the extensive *x*-ray department of the gynaecological clinic. One of the main characteristics of the new treatment was the precision in physical measurements. The skin dose, the depth dose, and other factors are measured accurately for each tube used, and these measurements are frequently checked. Dr. Martindale described the methods and apparatus by which such measurements are taken, and then gave an account of the treatment of the several conditions most suitable for *x*-ray therapy: (1) Climacteric haemorrhage; (2) uterine fibroids; (3) carcinoma of the uterus; (4) carcinoma of ovary, vulva, breast, and rectum; (5) tuberculosis of glands, peritoneum, ovaries, etc.; (6) gonorrhoeal salpingitis and other chronic inflammatory conditions. Whether or not this treatment eventually superseded operation, she urged that it should to-day be used in all cases of malignant disease in conjunction with operative treatment, and in all uncomplicated cases of climacteric haemorrhages and interstitial fibroids, without operation.

A discussion took place, in which Dr. FLORENCE STONEY, Dr. AGNES SAVILL, Dr. EVA WHITE, and Dr. HELEN CHAMBERS took part.

SURGICAL DIAGNOSIS.

AT a meeting of the Newcastle-upon-Tyne and Northern Counties Medical Society held in the Royal Victoria Infirmary, Newcastle, on February 1st, an address on diagnosis in surgery was delivered by Mr. D. P. D. WILKIE of Edinburgh to an audience of about 200.

Mr. Wilkie's address was a plea for the co-operation of practitioner, physician, and surgeon in the interpretation of early symptoms of disease. He said that the greatest need at the present time was for surgeons who knew *when* to operate rather than *how* to operate. The advances in surgery in the next decade would surely be in the accurate and timely diagnosis of the conditions which we had now learned to treat by surgical means, in the selection of the suitable case, and the elimination of those for whom an ill judged surgical procedure might be the first milestone on a dreary road that had many windings but no turning. Diagnosis was the crux of modern surgery, and the increasing success of the latter was due, in the lecturer's opinion, to the improved diagnosis of the general practitioner.

Mr. Wilkie then enlarged upon what he considered to be the fundamentals of diagnosis. He placed first clinical instinct, which came naturally to the few but to the majority was the outcome of prolonged, purposive, and careful observation. The tendency of modern teaching to bring pathology from the *post-mortem* room into the clinical departments should give to the next generation of medical men a real advantage. Next to clinical instinct, Mr. Wilkie put clinical history. The interpretation of symptoms was a problem which urgently required the co-operation of all branches of the profession. Medical literature required, from the pens of observant general practitioners, a statistical review of what certain symptoms meant in a long series of cases as met with in the general run of practice. Complete physical examination was the next essential: "We are so ready to be put off by finding one gross lesion that we often curtail our examination and overlook another."

If an accurate diagnosis was to be arrived at, full use must be made of the accessory or special methods of diagnosis. Some of these were simple and capable of almost universal application—for example, microscopical examination of urine and of stained blood films. Other methods required special training—for example, the Wassermann test. Exploratory operations on the urinary tract must now never be considered until cystoscopic examination, catheterization of the ureters, and pyelography had all been employed. Estimation of renal efficiency was of great value in sifting out the safe from the hazardous surgical risks, and the estimation of blood urea was now becoming practically routine before the operation of prostatectomy. The use of the basal metabolism test now enabled the practitioner not only to discover when cardiac symptoms were probably due to thyroid hyperactivity, but also to judge whether the nervous state of the patient was merely neurasthenic or due to poisoning by thyroxin. It was also a valuable guide as to the nature and extent of the operative interference which a patient would stand with safety. Again, the faint trace of jaundice, only with difficulty detected in the skin and eye, which accompanied the early dyspeptic attacks associated with cholelithiasis was readily shown by the following simple blood test:

If 5 c.cm. of blood be drawn into a syringe containing 1 c.cm. of sodium citrate solution to prevent coagulation, the mixture centrifuged and the serum pipetted off, the latter will give with nitric acid the fine play of colours familiar in the test for bile in the urine. This test is often positive when no jaundice is detectable and is valuable evidence of slight biliary obstruction.

The duodenal tube was a simple method of investigating the rate and nature of the biliary discharge. In conclusion Mr. Wilkie dealt at some length with the uses of radiography, but deplored the tendency to rely on such evidence in opposition to clinical findings.

AT a meeting of the Royal Medico-Chirurgical Society of Glasgow held on February 16th, Dr. J. FERGUSON SMITH made a communication on "Some points in the etiology of eczema." The conclusions arrived at were: (1) The skin of eczema patients is not abnormally sensitive to all irritants. (2) The skin of a patient or an experimental animal, sensitized to a protein, is not more sensitive to non-specific irritation than that of a normal person or animal. The sensitiveness is specific. Attention was drawn to an important class of case in which eczema appears to be due to sensitiveness to skin bacteria. Dr. IVY MACKENZIE made a communication on psychotherapy and the orthopaedic problem.

SURGICAL lectures were delivered to the Cambridge University Medical Society on February 1st by Dr. RODERICK and Mr. RUMSEY, illustrated by cinematographic films and lantern slides. Dr. Roderick related the history of bone grafting, and detailed the principles followed in operations involving the grafting of bone. A film was then shown depicting the preparation of a graft-bed in a humerus, the middle four inches of which had been shot away, and the insertion of a tibial graft from the patient's leg. Mr. Rumsey described the methods employed in skin grafting, and showed a film illustrating plastic surgery of the face.

AT a meeting of the West Kent Medico-Chirurgical Society, held at the Miller General Hospital, Greenwich, on February 9th, with Dr. W. H. PAYNE in the chair, Dr. JOHN PARKINSON, physician in charge of the Cardiological department, London Hospital, delivered an address on palpitation. He defined palpitation as consciousness of the heart beat—a subjective and sensory phenomenon, to be distinguished from tachycardia, for it was possible to have palpitation with a normal rate. The carditis was caused by afferent impulses through the vagus to the brain, and also by the heart beating against a too sensitive chest wall, and was uncommon in children or old people, but common at puberty and the menopause. The patient should be questioned about the duration and exciting cause. Palpitation at bedtime was frequently due to extra-systoles. The site might be the heart, neck, ears, and aorta. The attacks were often circumscribed. Dyspeptics were subject to palpitation; fear and emotional states (such as that due to speech making) were causes. Palpitation was prone to occur in highly strung, easily excited persons, and in those too concerned about themselves; also in thyroid cases. A loud first sound was frequent, but not a sign of disease. The apex beat was diffuse. Alcohol, tea, tobacco, worry, grief, and exercise were causes of tachycardia, which should be treated by bromides—not brandy. Persistent simple tachycardia was caused by hyperthyroidism, also by tuberculosis of the lungs and anaemia. In paroxysmal tachycardia the rate was from 140 to 240, and irregularity was always present in auricular fibrillation.

Reviews.

THE AUTONOMIC NERVOUS SYSTEM IN DISEASE.

The Sympathetic Nervous System in Disease,[1] by Dr. LANGDON BROWN, now in its second edition, is based on the Croonian lectures at the Royal College of Physicians of London for 1918, with the almost identical title, "The rôle of the sympathetic nervous system in disease"; it is a clear and attractively written account of a subject not only inherently difficult, but prone to be obscured by unproved hypotheses. With the wise moderation of a general physician, Dr. Langdon Brown has so happily combined the results of wide experience, reading, and a physiologist's education that it is not surprising that a second edition has become necessary. In the first chapter, dealing with the plan of the autonomic nervous system, a well deserved tribute is paid to the pioneer work of the author's teachers, Professor J. N. Langley and the late Dr. W. H. Gaskell; our knowledge of the sympathetic nervous system in the pre-Gaskell era is compared to that of the circulation before Harvey. His consideration of the pharmacological action of certain drugs on the autonomic nervous system is useful not only in facilitating comprehension of its make-up, but in estimating the value of the conception of vagotonia and sympatheticotonia due to Eppinger and Hess; in a later chapter devoted to vagotonia critical examination brings out the grave difficulties in accepting this ingenious hypothesis in its entirety, and shows that the case has been much overstated, though it contains a germ of underlying truth which deserves further investigation.

Though he does not profess to deal exhaustively with the reaction of the autonomic nervous system to disease Dr. Langdon Brown covers a wide field in the successive chapters on its relation to the endocrine glands, glycosuria, diseases of digestion, and to circulatory disorders. He argues that no theory of diabetes is adequate which leaves the sympathetic nervous system out of account, and that, if Graves's disease is a state of continuous fear, diabetes is a state of continuous mobilization of sugar, and that either of these may be due to dissociated action of the sympathetic nervous system.

After a discussion of the innervation of the alimentary canal and the work of Gaskell, Hurst, Keith, and others, its motor disturbances are summed up as (1) irregular and exaggerated contractions due to irritation of the parasympathetic, when in the region of the vagus producing colic, when in the pelvic area tenesmus; and (2) tonic spasm and atony, which are both due to the sympathetic, spasm depending on constriction of sphincters, atony, as in gastric dilatation, on inhibition of normal movements.

The chapter dealing with diseases of the circulation contains close reasoning on the relations of intracranial pressure and arterial blood pressure, and then shows the vicious circle that arises in cerebral haemorrhage and how venesection acts adversely; similar points in practical treatment are explained in cardiac and pulmonary diseases, and recent advances in our knowledge of shock are summarized. In fact, this is one of the most interesting chapters in a book on which the author may justly be congratulated.

FUNCTIONAL EXAMINATION OF THE LUNGS.

A SHORT book (*Examen fonctionnel du Poumon*[2]), beautifully printed and illustrated, and moderate in price, has just been published by Professor ACHARD and Dr. LÉON BINET of Paris. In the preface the authors rightly point to the great advances which have been made recently in the functional interpretation of disease and the application of experimental methods in elucidating functional failures. We therefore turned with much interest to their book.

The first part deals with the mechanical aspects of breathing. Graphic and other methods are described for recording and measuring the movements of the chest, the volume of air breathed, and the vital capacity. There are also sections on the *x*-ray observation of the diaphragm and on the time during which the breath can be held. The abnormalities revealed in disease by these methods are at the same time referred to. There is, however, hardly any reference either to the functional significance or the physiological causes of these abnormalities; nor are the different types of increased, diminished, or otherwise abnormal breathing clearly described. We expected to find the missing links in the second part, which deals with the chemical phenomena of breathing. This part begins with methods for determining respiratory exchange, and proceeds to discuss basal metabolism and diseases in which it is abnormal. There is also an interesting section on the influence of ingestion of sugar on the excretion of CO_2 in normal persons, in diabetes, and in other diseases. At the end there is a description of a not very accurate method of determining alveolar CO_2 pressure, and a short reference to the fall of alveolar CO_2 pressure in diabetes. The physiological significance of this fall is hardly even hinted at; and indeed one searches in vain in the second part for any chemical or other connecting link with the abnormal breathing referred to in the first part.

The truth is that the book practically ignores the advances during the last twenty years in the physiology of breathing and of the blood gases. There is not a word about the significance of changes in the gas pressures and hydrogen ion concentration of the arterial and capillary blood, or of variations in the pressure of CO_2 in the lung alveoli; nor about functional nervous abnormalities of breathing. Without the connecting links supplied by physiological and clinical investigation mere descriptions of methods and symptoms are of only limited use. The authors have unfortunately missed the opportunity of writing a most instructive book, such as we might have hoped for from countrymen of Paul Bert.

THE THEORY OF EMULSIONS.

The Theory of Emulsions and Emulsification,[3] by Dr. W. CLAYTON, is one of the series of "Textbooks of Chemical Research and Engineering" edited by Mr. W. P. Dreaper.

Professor Donnan has written a foreword, in which he points out the manifold directions in which the subject of emulsions is interesting. Milk, butter, margarine, the emulsions and ointments of pharmacy, the coal-tar disinfectants, rubber latex, and emulsified lubricants are a few examples of common and important emulsions.

Dr. Clayton gives a very clear account of the laws governing the behaviour of emulsions, and the book concludes with a bibliography of about 200 references. So far as we are aware, no previous monograph upon emulsions has been compiled. Those desiring information on this subject have accordingly had to try and find it in the textbooks of colloidal chemistry; in most of them the subject is dealt with in a very piecemeal fashion.

Considerable attention is paid to the technical problems involved, and the book should be of great value to the pharmacist who desires to learn the laws which govern the formation and stability of emulsions. It will be of great theoretical interest to the physiologist, for the recent work by Clowes and others upon emulsions of oil and water is discussed fully. Clowes showed that an emulsion of oil drops in water could be changed to an emulsion of water drops in oil by the addition of some electrolytes, and that the change was prevented by other electrolytes. This observation is of very great concern to physiologists, because living protoplasm is believed to consist of an emulsion of lipoids in proteins, and Clowes's work suggests a means by which the addition of electrolytes can alter the physical state of the surface membrane of cells and rapidly change their permeability. This is only one of the many interesting problems dealt with in the book, which will be found of value by a large variety of readers, dealing as it does with problems that range from the best methods of producing homogenized milk for ice cream manufacture to the methods employed for separating water from crude oil at oil wells.

DISEASES OF THE THYROID GLAND.

DR. ARTHUR HERTZLER'S *Diseases of the Thyroid Gland*[4] is a book of unusual interest in that the information contained therein is the result of years of experience of the treatment of these diseases in a small country hospital. After mentioning the disadvantages the author points out the advantages to be derived from this method of study—for instance, the isolation

[1] *The Sympathetic Nervous System in Disease.* By W. Langdon Brown, M.A., M.D., F.R.C.P. Second edition. Oxford Medical Publications. London: Henry Frowde, and Hodder and Stoughton. 1922. (Demy 8vo, pp. x + 161; 9 figures. 10s. 6d. net.)

[2] *Examen fonctionnel du Poumon.* Par Ch. Achard et Léon Binet. Paris: Masson et Cie. 1922. (Med. 8vo, pp. 154; 66 figures. Fr. 12 net.)

[3] *The Theory of Emulsions and Emulsification.* By W. Clayton, D.Sc., F.I.C. Textbooks of Chemical Research and Engineering. London: J. and A. Churchill. 1923. (Demy 8vo, pp. 160; 22 figures. 9s. 6d net.)

[4] *Diseases of the Thyroid Gland.* By A. E. Hertzler, M.D., F.A.C.S. London: H. Kimpton. 1922. (Sup. roy. 8vo, pp. 245; 106 illustrations. 25s. net.)

gives the investigators more freedom to follow their own ideas, uninfluenced by the opinion of associates; the small country hospital, drawing its patients from a stable population in the immediate community, is better able to study the end-results, and it is only by frequent re-examination of the patient that an accurate idea of the course of the disease can be obtained. As the result of his studies the author is convinced that the activity of the interstitial cells is associated with a definite clinical type of thyroid intoxication; hence the publication of this monograph.

The first and second chapters are concerned with the etiology and pathogenesis of goitre, with the pathological conditions of other organs, and with the normal and pathological anatomy of the thyroid gland. The etiology is discussed in its relation to such factors as age, sex, genital functions and disturbances, pelvic conditions, heredity, endemiology, infection, previous and associated diseases, and the neurogenic and thyrogenic theories. In the chapter on symptomatology he asserts that there is no such thing as a simple goitre, holding that goitres are either toxic or non-toxic, and the physician or surgeon must consider the so-called simple goitre as one not yet toxic, and treat the patient accordingly, otherwise his treatment may quickly convert it into a toxic one. He is also of opinion that in every case of goitre, whether toxic or not, there is either enlargement or anatomical change in the gland, and that those who hold the opposite view have yet to demonstrate the existence of a normal gland in patients who have suffered during their life from any form of thyroid disease. The chapters on diagnosis and prognosis deal with the adolescent goitres, the simple—or non-toxic—colloid goitres, secondary toxicity and malignant degeneration in such, together with affections of other organs, the primary toxic goitres—exophthalmic and non-exophthalmic—secondary toxic goitres, and atypical and hyperacute forms of these. His remarks on the interstitial type (formes frustes) (first described by Charcot and G. Marie) are interesting, and ought to be extremely helpful. His opinion of the Goetsch test is that it is only of relative value, because many patients not thyrotoxic are susceptible to adrenaline, while some with toxic goitres are not susceptible. When the diagnosis is evident from other signs and symptoms the test should not be performed, as its use often frightens the patient, owing to the exacerbation it causes when the larger amount is injected, while the smaller injection gives inconstant results. It is chiefly useful in border-line cases; in those that appear to be simply nervous a positive reaction may be given years before any other evidence of goitre appears. The author is doubtful also of the value of the basal metabolic rate test, and thinks that it is only of use in inverse ratio to the clinical experience of the surgeon. An interesting chapter on hospital management of goitre cases has been contributed by Dr. Victor Chesky, in which pre-operative and post-operative treatment and complications are dealt with. The rest of the book is concerned with treatment, general and operative, with descriptions and illustrations of the various operations performed on the thyroid gland.

This is a well written book, the references to current and past literature are numerous, the illustrations are excellent, and the author's opinions are carefully thought out.

THE BIOLOGY OF DEATH.

IT is the common fate of those nominated to lecture upon famous foundations in this country to find that neither the size nor the enthusiasm of the audience is commensurate with the dignity of the lectureship. The lecture theatres even of the Royal Society or the London College of Physicians are rarely packed to overflowing when the Croonian discourses are pronounced. Possibly the English nation has been over-lectured; or, again, it may be that the correlation between scientific eminence and elocutionary power is small. In America, we believe, the lecture-loving public is much larger. If Professor RAYMOND PEARL had a large audience for his Lowell lectures[5] in 1920, he must have convinced his hearers that they were wiser than the inert English, for his course was wonderfully stimulating.

Professor Pearl begins by defining his problem; he has no difficulty in showing that natural death is not the inevitable penalty of life—that, on the contrary, it occurs only in metazoan animals as a normal event, that even highly specialized cells are potentially immortal. He shows no mercy either to Weismann's theory that death is an advantageous adaptation preserved by natural selection, which, as he says, enjoyed a vogue "when the post-Darwinian attempt to settle the problems of evolution by sheer dialectic was at the zenith of its popularity," or to Metchnikoff's hypothesis. The chief difficulty with Metchnikoff's theory is, he says, "that it is demonstrably not true—either particularly in the case of man, where it can easily be shown that many statistically important causes of death cannot possibly be accounted for under it, or generally in the animal kingdom—because a number of cases are known where a metazoan form can be successfully made to lead a completely aseptic life, and still death occurs at about the usual time."

Why *do* metazoans die, then? Essentially Professor Pearl's answer is the same as that great pathologist H. G. Sutton's definition of disease—absence of rhythm. The body is not made like the wonderful "one-hoss shay"; the cellular systems fall out of balance, the environmental conditions which experiment shows to be necessary for cellular immortality are not maintained, or, as in malignant disease, there may be an outbreak of cellular bolshevism which destroys the commonwealth. What is the best way to live as long as possible? The best way of all is to be very careful in choosing one's ancestors. An analysis of Bell's statistics of the Hyde family and of the opinions of physicians on the preventability of various diseases leads Professor Pearl to conclude that, "if all the deaths which reason will justify one in supposing preventable on the basis of what is now known were prevented in fact, the resulting increase in expectation of life falls seven years short of what might reasonably be expected to follow the selection of only one generation of ancestry (the parental) for longevity." Another factor is the rate at which one lives. The world has long been of this opinion, which has been expressed by the sages of all times and in the adages of most nations. The additional support afforded by Slonaker's experiments upon four albino rats made to run a prodigious number of miles and dying at an average age of 29.5 months, while three control rats living a life of *otium cum dignitate* attained an average of 40.3 months, is meagre. This sort of experiment reminds us of the sage who could—

> "Resolve by sines and tangents straight,
> If bread or butter wanted weight;
> And wisely tell what hour o' th' day
> The clock does strike, by Algebra."

Is the greatly higher rate of mortality in later adult life of our industrial districts, compared with our agricultural districts, more likely to be a function of a higher rate of transformation of mere physical energy or of a much more subtle thing—what the public calls "nervous strain"? The man in the street will certainly say that the latter is the right answer. It is necessary to try to think clearly what precise meaning can be attached to the phrase "nervous strain" and then to investigate its social and economic correlates. For once we disagree with Professor Pearl, and do not think that, "as in so many other cases, the experimental method is likely to shed far more critical light on this problem than is the purely statistical method dealing with human data. There are too many factors in the latter material that cannot be controlled." They cannot be controlled, but perhaps they can be observed and measured. There are many other points in Professor Pearl's lectures, such as his extremely interesting study of longevity in flies, well worthy of examination. The first cross of a biologist and statistician is a very attractive hybrid.

MALIGNANT DISEASE.

IN an interesting and well expressed essay on the origin of cancers and other tumours M. JOSEPH STEFANI,[6] a surgeon at Nice, first reviews the existing opinions about the etiology and nature of malignant new growths and therein of course touches on many points that have aroused discussion. In opposition to the statement that cancer is contagious it has been objected that operating surgeons seldom suffer from it, but the author denies this, believing that this occurrence is common. Cancer houses are discussed, and here, as elsewhere, many authorities are quoted—for example, Gaylord and Clowes's observations on cancer cages. With regard to heredity it is considered probable that the cases which have been interpreted in this way are in reality due to familial

[5] *The Biology of Death.* By Raymond Pearl. Monographs on Experimental Biology. Philadelphia and London: J. B. Lippincott Co. 1923. (Post 8vo, pp. 275; 64 figures. 10s. 6d. net.)

[6] *Essai sur l'origine des cancers et tumeurs.* By Dr. Joseph Stefani. Paris: A. Maloine et Fils. 1922. (Imp. 16mo, pp. 209. Fr. 10.)

infection. Whilst believing that malignant disease is due to infection the author does not accept any of the current parasitic hypotheses. In the second part of his essay he elaborates his own theory to the effect that there is a special form of infection at work—namely, a process of conjugation between the cells of the host and unicellular organisms, probably protozoal, which gives rise to unicellular hybrids, the tumour cells.

Cancer: its Cause, Treatment, and Prevention is a reprint, with some additions, of a series of addresses published between 1902 and 1910 by Dr. A. T. BRAND,[7] in which he insists on the infective origin of cancer, its exogenous and specific nature, and the presence of a parasite—whether protozoal or bacterial, though he is in favour of a facultative aerobic bacterium—in the cells. The only reliable prophylactic against cancer is held to be cleanliness in its widest sense, including cremation of its victims and destruction by fire of all soiled dressings and discharges from cancerous patients. After advocating free operative removal of the growth, Dr. Brand pleads for research for a specific parasiticide.

In the tenth number of the Harvard Health Talks, delivered as a popular Sunday afternoon lecture at the Harvard Medical School, on *New Growths and Cancer*, by Professor S. B. WOLBACH,[8] the present state of our knowledge is clearly and simply set forth with suggestions for prevention and treatment. As statements meeting with general scientific approval, he mentions the non-hereditary and non-infectious nature of cancer, so that it cannot be transmitted from person to person. On the question of the alleged increase of cancer, the dictum of Professor Willcox of Princeton that it is probable, although far from certain, that the cancer mortality is not increasing, is quoted with approval. This common-sense lecture concludes with some wise advice on the care that should be exercised in choosing a doctor, and points out that the more rapidly the public learns to be discriminating in its choice of medical men the more rapidly will the standards in the practice of medicine become elevated.

The Provincial Board of Health, Ontario, has issued two pamphlets—*What We Know about Cancer, a Handbook for the Medical Profession*, and *What Everyone Should Know about Cancer, a Handbook for the Lay Reader*[9]; both of these were prepared by a special committee of the American Society for the Control of Cancer, and have been republished with the consent of the society. The increased incidence of malignant disease throughout the world is accepted; in Ontario during the last decade the cancer mortality has risen from 66 to 77 per 100,000, while that from tuberculosis has diminished from 102 to 78 per 100,000. Recent investigations show that malignant disease is rare among the Indians in Canada; although white races are considered to be more liable to cancer than North American Indians and Orientals, cancer of the uterus in America is apparently more frequent in negro than in white women. These two useful pamphlets are full of common sense and good advice.

In *Le cancer et son traitement médical rationnel*[10] Dr. E. BARONAKI argues that malignant disease is a local manifestation of a general dyscrasia resulting from functional disorders of the endocrine glands, which in its turn is due to age, hereditary influences, infections, especially enteric fever and syphilis, mental shocks, and to excess of calcium in drinking water. The blood shows alterations in the organic ferments, in the plasma, which is stated to be almost always acid and deficient in salts, especially of calcium. His treatment consists in intramuscular injections of neoplastin—a solution of salts of calcium, potassium, sodium, magnesium—and phosphorus, for twenty days, and in addition cachets of cholesterine, lecithine, and haemoglobin, and the administration of the liquid extracts of thyroid, the adrenal, liver, and spleen. In doubtful cases eventually proved to be free from cancer the injections of neoplastin cause digestive disturbance, but otherwise the treatment is stated to be harmless, and thus may serve as a means of diagnosis. In early cases of malignant disease not involving any vital part a cure is claimed in 80 per cent.; in recurrences on the surface of the body, especially of the breast, without visceral metastases, cure or a stationary condition for some years is said to follow in 70 per cent.; in widespread visceral malignant growths no curative action is suggested. This unconvincing and insufficiently proved argument closes with the record of twenty cases.

[7] *Cancer: its Cause, Treatment, and Prevention.* By Alex. Theodore Brand, M.D., C.M., V.D. London: John Bale, Sons, and Danielsson, Ltd. 1922. (Post 8vo, pp. viii+120. 8s. 6d. net.)

[8] *New Growths and Cancer.* By Simeon Burt Wolbach, Shattuck Professor of Pathological Anatomy in Harvard University. Harvard Health Talks, No 10. Cambridge, Mass.: Harvard University Press; London: Humphrey Milford. 1922. (Fcap 8vo, pp. 55; 2 plates. 4s. 6d.)

[9] *What We Know about Cancer; a Handbook for the Medical Profession.* 1922. (Pp. 58.) *What Everyone Should Know about Cancer; a Handbook for the Lay Reader.* 1922. (Pp. 26.) Published by the Provincial Board of Health, Ontario.

[10] *Le cancer et son traitement médical rationnel.* Par Ed. Baronaki, Chirurgien honoraire de l'Hôtel-Dieu de Blois. Paris: A. Maloine et Fils. 1922. (Cr. 8vo, pp. xv + 101. Fr. 6.)

DEAN INGE'S ESSAYS.

THE second series of *Outspoken Essays*,[11] by the Dean of St. Paul's, is a most attractive collection of essays on the problems of this troubled age. More than half of the book has not been published elsewhere. The first article, Confessio fidei, explains what and why the author, who would describe himself as a Christian Platonist, believes. The Hibbert Lectures, delivered at Oxford in 1920, on The State, Visible and Invisible, the Romanes Lecture for 1920 on The Idea of Progress, and the Rede Lecture for 1922 on The Victorian Age, contain much interesting matter.

Both in the Hibbert lectures and in The Victorian Age the principle that all human movements tend to provoke violent reactions, and that every idea or institution passes on to its opposite, is regarded as the keynote of history. The nineteenth century was the most wonderful century in human history, and the Victorian age the culminating point of our prosperity; and as an antidote to the evil fashion of disparaging the great Victorians the Dean recommends a comparison of their portraits with those of the present-day favourites. In The White Man and his Rivals it is argued that the peril from the coloured races, which before the war loomed in the distance, is now of immediate urgency, and that the exhausted and debt-crippled white nations will be defeated in the coming economic competition. The article entitled "The Dilemma of Civilization" reviews the contents of two recent books on scientific sociology by Müller Lyer and Austin Freeman, and discusses the possible escape from the conditions brought about by machinery. The concluding essay, on Eugenics, insists on the necessity of counteracting racial deterioration by rational selection. These essays make a strong appeal to all thoughtful men, and are clearly and convincingly written.

NOTES ON BOOKS.

THE third edition of Sir JOHN MCFADYEAN'S *Anatomy of the Horse*[12] will be welcomed by veterinary students, for it has been the standard British textbook for many years. The whole of the text has been carefully revised, and the name of the author is sufficient guarantee that it has been brought up to date, especially in regard to nomenclature, about which there are still some differences; it is necessary for the student to be aware of these when about to present himself before a board of examiners in anatomy. The system Sir John McFadyean employs is based on the principle of naming each object after the homologous object in human anatomy; at the beginning of the book is a very well arranged table showing the synonyms of the muscles; in this the first column, giving the author's nomenclature, is followed by that of Percival, Chauveau, and Legh. In the earlier chapters the dissection of the limbs, of the back and thorax, of the head and neck, and of the eyeball and ear, are dealt with in order, and then that of the various important internal organs of the thorax and abdomen. Each is lucidly described and excellently illustrated, the whole being typical, as in previous editions, of the thoroughness and care which have been bestowed upon the book. The book has long been prized, and will long be prized, by the veterinary student, and should find a place on the bookshelf of every veterinary practitioner who wishes to keep himself abreast of the times.

The third number of the fourth volume of the *Annals of Medical History*[13] has two portraits of Louis Pasteur—one on the cover, and a frontispiece, the familiar representation of

[11] *Outspoken Essays.* By William Ralph Inge, C.V.O., D.D., F.B.A., Dean of St. Paul's. Second Series. London: Longmans, Green and Co. 1922. (Cr. 8vo, pp. vii + 275. 6s. net.)

[12] *The Anatomy of the Horse: A Dissection Guide.* By Sir John McFadyean, M.B., C.M., B.Sc., M.R.C.V.S. Third edition. Edinburgh and London: W. and A. K. Johnston, Ltd. 1922. (Demy 8vo, pp. xx+388; 54 figures, 48 plates. 3os. net.)

[13] *Annals of Medical History.* Vol. iv. No. 3. September, 1922. Serial Number 15. Edited by Francis R. Packard, M.D. New York: Published quarterly by Paul B. Hoeber. (Med. 4to, pp. 215-322. Yearly subscription 8 dollars; single numbers 2.50 dollars.)

him in his laboratory. The editor, Dr. FRANCIS R. PACKARD, continues his interesting account of Guy Patin and the medical profession in Paris in the seventeenth century. In the next article—on Robert Talbor, Madame de Sévigné, and the introduction of cinchona, an episode illustrating the influence of women in medicine—Dr. George Dock of St. Louis describes how he picked up in Shaftesbury Avenue, for a trifling sum, Robert Talbor's *Pyretologia*, of which the only other copy known to him is in the British Museum; Talbor advocated the use of cinchona in a work savouring strongly of the charlatan, but numerous extracts from Madame de Sévigné's letters breathe her belief in him. Dr. Robert Wilson discusses the origin and symbolism of the caduceus, and concludes that, whether the caduceus in its present form originated as an Egyptian or as an Assyrian device, its symbolism dates back to predynastic Egypt. The Hon. W. R. Riddell, President of the Canadian National Council for Combating Venereal Disease, gives a sketch of Dr. George Cheyne and "the English malady," in which he remarks that though usually a disease named after a nation is an expression of enmity, as is shown by the nomenclature of venereal disease, the condition was different as regards the "English malady," a combination of neurasthenia, melancholy, and dyspepsia, described by Cheyne. In a well illustrated account of the early history of anatomy in the United States Dr. E. B. Krumbhaar shows that Thomas Cadwalader of Philadelphia was the first to initiate the scientific study of anatomy, and that the first course of lectures and demonstrations was given by William Shippen junior in 1765, when, together with John Morgan, he founded the medical department of the University of Pennsylvania in Philadelphia. Dr. Burton Chance writes on some English worthies of science of interest to ophthalmologists—namely, Sir Isaac Newton, W. H. Wollaston, J. Dalton, and Thomas Young, "Phenomenon Young," as he was called at Cambridge.

The second volume of the Oxford Chapters in the History of Science, edited by Dr. CHARLES SINGER, is a translation of Professor Heiberg's *Naturwissenschaften, Mathematik und Medizin im klassischen Altertum*.[14] Within the compass of 105 pages the author has contrived to give a remarkable amount of information in a readable form. The difficult task of giving a non-technical account of Greek mathematics has been skilfully performed, while the account of the medical writers, if in places somewhat amateurish, is lucid and interesting.

In his book *The Problem of Population*[15] Mr. HAROLD COX discusses in an orderly way the facts of the population problem and the ethics of birth control. The author does not, we think, bring forward any statistical or economic evidence which has not long been familiar to all serious students of the subject, but he possesses one great advantage over many other writers. He has thorough command of a clear prose style, rarely diverges from argument into rhetoric, and deserves the compliment of a comparison with Malthus.

[14] *Mathematics and Physical Science in Classical Antiquity.* Translated from the German of J. L. Heiberg by D. C. Macgregor. Chapters in the History of Science. London: H. Milford, Oxford University Press. 1922. (Cr. 8vo, pp. 110. 2s. 6d. net.)

[15] *The Problem of Population.* By Harold Cox. London: J. Cape. 1923. (Cr. 8vo, pp. 198. 6s. net.)

MEDICINAL AND DIETETIC PREPARATIONS.

"Secwa."

SECWA is a dry powder product introduced by Trufood Ltd. (The Creameries, Wrenbury, Cheshire) for the preparation of sweet whey. The manufacturers claim that it contains all the components of ordinary fresh milk, except the casein and fat, and of course the water. A sample has been submitted to analysis, and is found to consist only of the dried contents of milk whey. It contains no starch or other matter foreign to the composition of milk, and it is free from boric acid and milk preservative.

The following is the composition shown by our analysis:

Protein	19.33 per cent.
Lactose	67.70 ,,
Mineral matters (ash)...	9.02 ,,
Fat	0.66 ,,
Moisture	3.25 ,,

The characters of the sample show that the constituents have suffered no injury or alteration in nature through the process of desiccation. There is no sign of the change of colour which articles of this nature readily undergo if unduly heated, and the lactalbumin (whey protein) is perfectly soluble.

SLEEPING SICKNESS:

SOME NEW OBSERVATIONS ON ITS TRANSMISSION AND PREVENTION.

WHEN the discovery, in 1908–10, of scattered cases of human trypanosomiasis in North-East Rhodesia and Nyasaland led to the appointment of commissions for their investigation (the Royal Society's Commission under Sir David Bruce in Nyasaland and Dr. Kinghorn and Dr. Warrington Yorke in Rhodesia) it was found that, in its morphology, its action on animals, and its reactions to culture and serums, the new trypanosome, *T. rhodesiense* of man, was indistinguishable from a trypanosome which infested the game of the same regions. So close was the resemblance that the investigators felt that they could come to no other conclusion but that the two trypanosomes were specifically identical, and that the big game was the main or only reservoir for Nyasaland sleeping sickness. On this conclusion was based a practical recommendation—namely, that an experiment in game destruction should be made under scientific control. An area was to be selected and, after certain preliminary statistical investigations, the game in it was to be completely eradicated, and the entry into it of game from other areas prevented by a suitable barrier. In two or three years the population, the live-stock, and the tsetse fly were to be examined again. Even if the fly had not then disappeared owing to the absence of the game it might at least be found that it had become non-infective. In either event the policy would then be to kill and drive away game in the neighbourhood of human habitations and roads.

Both the experiment and the policy were recommended by the Inter-Departmental Committee, which reported in May, 1914, but the validity of the conclusion which had first prompted these suggestions had already been seriously questioned. It was pointed out that in vast areas of Africa *Glossina morsitans*, human beings, game, and *T. brucei* were present together, and that the incidence of Nyasaland sleeping sickness would be far higher were this trypanosome pathogenic to man. Taute even inoculated himself repeatedly, and, at a later date, he and Huber inoculated themselves and 129 natives, many of them debilitated, with the game trypanosome, without obtaining a single positive result.

Duke, however, in 1919, published in respect of the Uganda disease the suggestion that, man being highly resistant to trypanosome infection (a criticism of Taute's experiments which had already been made), human trypanosomiasis in epidemic form can only be brought about, and is brought about, by repeated transmissions of the trypanosome from man to man direct; in the laboratory it is often possible by this method to render virulent for a particular species of animal a strain of trypanosome to which it was previously refractory, and Duke suggested that this mechanical transmission was effected in nature by *G. palpalis* itself, and that the crowded canoes, accompanied by tsetses, of the Victoria Nyanza provided the ideal condition. If this were applicable to *G. morsitans* also and the scattered cases of Nyasaland, it followed that Taute's experiment had not gone far enough, and that *T. brucei*, transmitted directly from man to man, might after all be capable of giving rise to *T. rhodesiense*.

The next light on the problem has come from an outbreak of sleeping sickness of the *rhodesiense* type in the country south of the Speke Gulf, in the Mwanza District of Tanganyika Territory, about six and a half degrees farther north than the most northerly cases of the disease previously recorded, though we now have news from Dr. Archibald of a discovery of *rhodesiense* sleeping sickness in the Sudan. The Mwanza outbreak, which began probably about 1917 and comprised a few hundred cases, is interesting for at least two reasons. In the first place, the disease prevailed as an epidemic, a new feature in the Nyasaland type; and secondly, it was carried, not by *G. morsitans*, but by a new fly of the same group that has been described by Major Austen as *G. swynnertoni*. The outbreak was discovered by Dr. G. Maclean, of the Medical Department of Tanganyika Territory, and has been investigated in turn by Mr. Swynnerton and by Dr. Duke. Each has now published his account of it.*

Swynnerton, studying the outbreak from its entomological

* "The Entomological Aspects of an Outbreak of Sleeping Sickness near Mwanza, Tanganyika Territory," by C. F. M. Swynnerton, F.L.S., F.E.S., *Bull. Ent. Res.*, vol. xiii, Pt. 3, pp. 317–370; and "An Enquiry into an Outbreak of Human Trypanosomiasis in a '*Glossina morsitans*' Belt to the East of Mwanza, Tanganyika Territory," by H. Lyndhurst Duke, M.D., Bacteriologist, Uganda Protectorate, *Proc. Roy. Soc.*, Series B, vol. 94, No. B. 660, January 4th, 1923.

side, found that, within the sleeping sickness area, the tsetses, which were very numerous, were exceptionally voracious in relation to man and in general presented the high proportion of females that has come to be recognized as the sign of a scarcity of food animals. Investigation showed that something not unlike the proposed experiment in game destruction had here been produced by natural causes. Tsetse flies do not frequent closely cultivated areas but live and breed in natural woodland. A corner of the woodland in this fly belt had been cut off from the rest by a discontinuous strip of native settlement. This strip acted as a partial barrier against the game animals and to an appreciable extent hindered the replenishment of the game in the enclosed section. The game inside became much reduced, though by no means exterminated, and the reduction was particularly marked at and after the time the epidemic probably began, because the normal activities of a large contiguous hunting population were then reinforced by the passage of troops and the incentive to wholesale killing that was furnished by a severe famine. In addition two important factors might be thought of as tending to diminish natural resistance: famine and influenza swept the land in the train of the military operations in Mwanza in 1917, and much ankylostomiasis was present in the population.

Sleeping sickness was definitely present in the area at the beginning of 1918. It seems to have started in the neighbourhood of a place called Igombe and to have spread with much regularity from village to village in different directions until it reached the cleared and settled "barrier." Areas of more open woodland with fewer tsetses, the barrier itself, and the coming into contact with a larger game population are three explanations offered by Swynnerton for an apparent check to the epidemic at this stage. He found it easy to trace a sequence between any case and preceding cases, and in this is strongly confirmed by Duke. Thus a woman sick with *malali* came from Ndagalo and stayed at two villages near Nyasambi, at the second of which she died. Shortly afterwards cases occurred at each village, and the people from neighbouring villages who regularly visited and sat with the sick and attended the mourning fell ill in their own villages, where further cases then occurred. One case taken to a clean village to be nursed introduced the disease there, and a "beer drink" at that village, where there were many tsetses, passed the disease on further. This was the story everywhere; going to see the sick and taking the sick in were, Swynnerton states, the commonest sources of infection recognized by the natives.

Duke believes that the outbreak originated through the development from the game trypanosome of a strain pathogenic to man, as a result of free direct transmission following game destruction and the consequent concentration of the fly on man. Swynnerton presents two alternative explanations—the first is the same as Duke's, the other the possibility of the disease having arisen through the introduction of an infected human being. In favour of the second alternative he points to the subsequent course of the outbreak, to the general analogy with Uganda sleeping sickness, and to the fact that in this very district the Germans captured Belgian native soldiers infected with trypanosomiasis, one of whom stated that he had been treated for it already in his own country. Each explanation involves what is at present a hypothesis: the first that *T. rhodesiense* can arise from *T. brucei*, and, in addition, that this happened here; the second that *T. rhodesiense*, already differentiated as a human strain, either came from far south or exists undiscovered in the little investigated Congo.

After describing the habits of the natives and the conditions in the villages, Swynnerton concludes that the tsetses had abundant opportunity of biting the sick, and that any infected person may be an important reservoir of the disease; he points out also that factors favouring direct transmission by this fly of the *morsitans* group were present. Duke adduces observations and arguments in favour of the probability that direct transmission was present to the exclusion of cyclical transmission. Both agree that the game, far from being a menace, is a valuable buffer between man and the fly. They hold that reduction of the game must lead to greater concentration of the tsetse on man, and consider that this factor probably contributed to the production of the epidemic. It is reasonable to suppose that the greater the number of tsetses driven to feed on man the more easy and frequent will be the infections and the greater also the likelihood of direct transmission such as might either render a game trypanosome pathogenic for man or help a human trypanosome to overcome man's normal resistance. Swynnerton points out that in Northern Rhodesia in 1911–13 famine, with game present in abundance and with sporadic human trypanosomiasis existing, failed to produce an epidemic. He regards famine and game destruction as likely to be the most dangerous combination, but believes the latter to be highly dangerous in itself, if human infection exists; he cites instances recorded by others which suggest that sleeping sickness in the epidemic form tends to accompany a scarcity of game. This is a point worthy of further study. Meanwhile it will be well to walk warily in the matter of eradicating the game from the neighbourhood of human habitations in tsetse-infected bush.

The connexion traced by Duke between ankylostomiasis and sleeping sickness in the Mwanza outbreak seems likely to be important, and his suggestion as to its further investigation should be followed up; the rarity of the disease in children is of interest, and bears out Ingram's conclusion that "age, sex, and race incidence in human trypanosomiasis vary directly with the extent to which the individual is exposed to the bite of infective tsetse flies"[1]; the fact that visits to the sick people in infected "bush villages" resulted in many infections, even in villages outside the tsetse forest, is also worthy of note. In a specially infested small bush village Swynnerton captured about 200 tsetses, and noted that the inhabitants were attended by them in all their occupations.

The chief significance of these two investigations is the evidence they afford that under the conditions described man was the important reservoir. While it seems possible that *T. brucei* is capable of conversion into a strain pathogenic to man, it seems unlikely that this often happens in nature. On the other hand, we have to remember that any of the four or five hundred persons infected in this Mwanza outbreak, travelling from the place of his infection, might "subsequently sit down and talk in a village or roadside halt in any tsetse belt in the territory in a locality in which man is for the time being the centre of attraction for the tsetse . . . and start a case or two or an epidemic." Swynnerton quotes evidence in favour of the view that it was in this way that the previous infections of *rhodesiense* in German East Africa started, and Duke also concludes that "the main danger to be avoided is the presence of infected natives in communities exposed to the tsetse."

It would seem that the practical question for future investigators will be less the conspecificity of the game and human trypanosomes (though this, and its importance, should be settled) than the prevalence of the human "carrier." Yorke has given an instance of a native laboratory assistant who, after *T. rhodesiense* had been found in his blood, was under observation for a year, and remained to all appearance perfectly well; it should be ascertained (not merely by blood examination, which may be unreliable, but by inoculation into susceptible animals) whether such cases are frequent. This seems of special importance at present, for natives from various parts of Africa have, in the course of the East African campaign, passed through the infected region of Portuguese Nyasaland, so that, if the human "carrier" should be a factor of importance, the ready-made *rhodesiense* strain may have been transplanted already to many places in which it did not previously exist.

Mr. Swynnerton describes the measures taken for the control of the outbreak. They included segregation of the sick and the evacuation of the area specially concerned, this last being rendered easy by the fact that it was surrounded by the tsetse-free areas of close settlement already referred to. He deals at some length with the general question of the control of the flies of the *morsitans* group, and in relation to the prevention of human trypanosomiasis points to the probable utility of a combination favoured by French investigators—namely, the sterilization of the sick by the administration of a suitable drug and the provision of a "screen" of immune animals. Due, but reasonable, game preservation would, he believes, in East Africa provide the "screen," and to guard against the untoward results of such local game destruction as might still take place he suggests that the natives might be required to place their villages in the centre of their cultivation and that small villages should be joined up so far as possible into large settlements in order that they may be surrounded by a larger cleared space and thus enjoy a greater immunity from heavy infestation by the tsetses. It would seem likely also, from Duke's observation in relation to ankylostomiasis, that due attention to this disease may in itself constitute a useful prophylactic measure in relation to sleeping sickness.

[1] Accra Laboratory Report for 1915.

British Medical Journal.

SATURDAY, MARCH 3RD, 1923.

SIR CHRISTOPHER WREN AND MEDICAL SCIENCE.

SUNDAY, February 25th, marked the 200th anniversary of the death of Sir Christopher Wren. This "prodigy of learning" was born at East Knoyle, near the Somerset border of Wiltshire, on October 20th, 1632, where his father, Dr. Christopher Wren, was rector. He came of a learned and talented stock: his grandfather, Dr. Matthew Wren, had been bishop successievly of Hereford, Norwich, and Ely; his father became Dean of Windsor. Wren was at school under Dr. Busby at Westminster, where he was contemporary with John Locke, who was just two months his senior. At the age of 13 he entered, as a gentleman commoner, Wadham College, Oxford. In his second year at Oxford his abilities attracted the attention of Dr. (afterwards Sir) Charles Scarborough, who was then lecturing in anatomy. Young Wren wrote with pride to his father in a Latin letter of his friendship with the "doctor." He assisted Scarborough as demonstrator in his anatomical lectures, and brought his mathematical knowledge, which was already remarkable, into play in studying the mechanics of muscular action. He composed later a treatise on the motion of the muscles, explaining the whole anatomy by models formed in pasteboard. They were presented to that eminent physician and his excellent friend Sir Charles Scarborough for use at the latter's celebrated lectures at Surgeons' Hall. These models were lost at the fire of London.

Dr. Plot, in his *Natural History of Oxford*, relates that among divers experiments in anatomy which Wren exhibited at the meetings at Oxford were schemes of fishes dissected . . . several things he observed very considerable in fowls. Some parts of animals he more exactly traced by the help of glasses, as the kidneys, the plexus in the brain, etc. The nerves he found to have little veins and arteries in them. He then found the lymphaeducts to empty themselves into the receptacle of chyle, from all parts of the bowels, limbs, etc. Wren assisted Thomas Willis, too, in his anatomical dissections and demonstrations, and Willis testifies in the preface to his *Cerebri Anatome* that the illustrations in that book are from the pen of Sir Christopher Wren.

There can be no doubt that Wren's anatomical observations placed him among the first professors of the day. Sprat, in his history of the Royal Society of London, refers to him as "the first author of the noble anatomical experiment of injecting liquors into the veins of animals . . . by this operation divers creatures were immediately purged, vomited, intoxicated, killed or revived according to the quality of the liquor injected." Among the drugs with which he experimented in this way were scammony, opium, and wine. From these experiments he conceived the idea that blood might be transfused directly (and without coagulating) from the vessels of one individual into those of another. Aubrey quotes the Rev. F. Potter as stating that "at the Epiphaniae, 1649, when I was at his house, he [that is, Wren] then told me his notion of curing diseases, etc., by transfusion of blood out of one man into another, and that the hint came into his head reflecting on Ovid's story of Medea and Jason." This was an experiment which Wren took to be "of great concernment and what will give great light to the theory and practice of physick." But it does not appear that Wren himself did more than suggest the possibility of direct blood transfusion. Richard Lower witnessed these experiments of injecting drugs into animals' veins, and evidently joined in discussions on the practicability of blood transfusion. It was left to him to devise a technique and put into practice for the first time Wren's suggestion. Lower added a complete chapter to his *Tractatus de Corde* (1669), in which he boldly claims priority for successfully transfusing blood from one dog into the veins of another. He describes how at Oxford, towards the end of February, 1665, in the presence of Dr. John Wallis and Dr. Thomas Millington, he demonstrated at the academy of medicine that the experiment could be safely performed. Lower does not include Wren among the spectators of the experiment which the latter had spoken of in 1649. But Wren may have been in Paris at the time, for he spent several months of 1665 in the French capital, where the plans for the Louvre, then in the course of building, won his ardent admiration. In the later part of that year he returned to London, and, like Glisson, Wharton, and a few other scientific spirits, he outstayed the Plague.

Although by now Wren was busily engaged in architectural work, his interest in anatomy and experimental medicine had by no means waned. In 1667 he wrote a letter to Scarborough in which he recounts some of his observations in this line, including the anatomy of the bones of the arm, dissections of the eel, and the operation of splenectomy in the dog. His inventions and apparatus covered nearly as wide a field as those of Leonardo da Vinci himself. He constructed a model of the eye, as large as a tennis ball, with the humours truly and dioptrically made; found a new way to grind glasses, invented new musical instruments, devised ways of submarine navigation, designed new offensive and defensive engines of war, and was the first to draw pictures of objects observed by microscopical glasses, as well as the inventor of the art of mezzotint engraving. The microscope, indeed, continued to attract his attention, and in 1677 we find him taking part in a discussion at the Royal Society on Leeuwenhoek's observations.

Wren's inaugural address before the Royal Society manifests his lasting enthusiasm for scientific medicine. There were three ways, he said, of obliging posterity—by advancing, first, knowledge; secondly, profit; and thirdly, health and conveniences of life. He foresaw the importance of studying the human organism from a biochemical standpoint: "Thus in the body of a man if we consider it only mechanically we may indeed learn the fabric and action of the organical parts, but without chymistry we shall be at a loss to know what blood, spirits and humours are, from the due temper of which (as of the spring in the barrel wheel) the motions of all parts depend." In this address he pays due tribute to Harvey's work, and outlines some of the subjects which might profitably be investigated by the Royal Society. Amongst medical subjects he mentions dissections, physiology, epidemical diseases, and diseases of grain, fruits, and grasses, with their effects upon animals. But although Wren still watched the onward march of natural science, his own labours henceforth lay in the field of architecture. His work in anatomy, physiology, and experimental medicine belonged to the earlier years of his life. How much medicine owes to his inventive genius can never be wholly known. What he achieved was important enough, what his contemporaries may have accomplished at his instigation can only be guessed at from such an example as Lower's successful experiments in blood transfusion.

Wren died in his ninety-first year; on February 25th, 1723, his servant, thinking he slept longer than usual after dinner, went into his apartment and found him

dead in his chair. His long life gave him for contemporaries all the wits, writers, artists, warriors, and ministers of the reigns of Charles I, Cromwell, Charles II, James II, William III, Anne, and George I. In his boyhood Evelyn, who met him at Oxford, had called him "that rare and early prodigy of universal science," and he never fell short of this early promise; to the end of his noble life he was distinguished for industry, love of art, placidity, modesty, communicativeness, and disinterestedness. Few men have been more generous in suggesting problems for others to work out; few, even among scientists, have cared less who claimed the fruits of their own genius. He wrote and published comparatively little. Hearne noted in 1713: "Sir Christopher Wren is a very great man, tho' he could never be persuaded to publish anything." In a French journal of 1750 he was described as possessing the failing, uncommon in an architect, of not knowing how to enrich himself. As a writer of to-day has said, "He was really an artist using the stuff of science as his material."

BIOLOGICAL FOUNDATIONS.

DR. HALDANE, whose lecture on the fundamental conceptions of biology we print in this issue, has for many years devoted himself with conspicuous success to the investigation of the incredibly delicate mechanism by which the regulation of various physiological processes is effected in the animal body. When, therefore, we find him taking his stand against the mechanistic interpretation of life so familiar to physiologists at the present day, we must recognize the fact that he speaks with the authority derived from experience, and that his views are entitled to the most careful consideration. It is not altogether easy, however, on the basis of a single lecture, to determine exactly what those views are. There seems to be something rather elusive about them, and some will probably think that he is abandoning the safe ground of experimental science for the less secure foothold of metaphysics.

Dr. Haldane emphasizes the fact that biology is an independent science, of which physiology is one department—a fact that is too often lost sight of at the present time. The living organism, he tells us, is a whole which is something more than the mere sum of its parts, and must be studied and appreciated as such. No chemical and physical interpretation of its behaviour, however detailed, can give us a real insight into its nature. We welcome this reaction against the extreme materialistic tendency of some contemporary writers, but at the same time we cannot help thinking that he rather overstates his case, as when he tells us "that with neither the scalpel nor microscope as applied to dead organisms could structure be found that was capable of throwing light on any fundamental physiological activity." The remarkable nuclear phenomena accompanying cell division—to take only one illustration out of many—have surely thrown a flood of light upon the physiological activities involved in the processes of heredity, and yet these phenomena have been revealed to us almost exclusively by the microscopical study of dead organisms chemically treated. Possibly, however, the processes of heredity as thus revealed are not, in Dr. Haldane's opinion, fundamental. Perhaps nothing that is really fundamental is accessible by the methods of experimental science; but if so, biology, which depends entirely upon observation and experiment, can hardly be said to have any fundamental conceptions at all—for these we must look to metaphysics.

Although we by no means think that mechanistic interpretations can ever afford a complete explanation of the living organism—or of anything else—yet it seems to us that they can take us a good deal farther than Dr. Haldane seems disposed to admit. He says that the mechanistic theory of life involves us in meaningless absurdities; but surely this is true only when it is pushed to a supposed finality. There is nothing necessarily absurd in a mechanistic theory of development. There is no need to suppose that the whole machinery of the adult organism is represented in some way in the fertilized egg. We need only assume that the germ plasm, being part of the same stock, is similar to that of previous generations, and that it is exposed during its development to similar conditions. The machinery develops gradually, as the result of the interaction between the developing organism and its environment, internal and external. The marvel is that the comp ex processes involved are regulated with such accuracy as to lead to practically the same result generation after generation. It is this wonderful power of regulation that constitutes the chief distinguishing feature of the living organism. The vitalists attempt to explain it by postulating a special vital force, which leaves us exactly where we were. Nor does the hypothesis of an indwelling soul help towards a scientific explanation. The mechanists alone are in a position to push the scientific analysis of vital phenomena to its farthest limits. Those limits have not yet been reached. In any case it must be left to the metaphysician to speculate as to things that are fundamental.

That the living organism is something more than a mere machine we can hardly doubt when we consider the phenomena of consciousness and intelligence as manifested in ourselves. At what point in the scale of evolution consciousness began to emerge we do not know. Nature knows no beginnings, only change. Dr. Haldane would exclude "the distinctive characters of conscious responses as such" from the domain of biological science and hand them over to psychology. But surely consciousness is the culminating manifestation of life, and if psychology is to make any progress as a real science it must be as a department of biology. What Dr. Haldane is really aiming at is the re-establishment of "the spiritual interpretation as the supreme interpretation of our universe." This is in no way inconsistent with the mechanistic interpretation of the living body. Science can never hope to explain anything completely, but that is no reason why she should not carry her explanations as far as she can. The wonderful progress in medical science, for instance, during the past century has been due almost entirely to mechanistic methods of thought and investigation, and the more these methods are developed and perfected the better will it be for the bodily health of the human race. The spiritual health is another, though a closely connected, problem, and perhaps a more important one, but it can hardly be dealt with in the same manner. From the broader point of view, however, nature and spirit are one, and there is really only one science, which we attempt to subdivide for our own convenience and in accordance with our own narrow limitations.

We could wish that Dr. Haldane had had time to elaborate his thesis from the evolutionary point of view, for it is to the study of evolution, in its broadest aspects, that we must look for more light upon the meaning of life. From this point of view the distinction between the living and the not living tends to disappear, and we find ourselves face to face with a continuous sequence of events that probably stretches back without interruption from the organic into the inorganic world. It would appear that as matter gradually acquired an ever-increasing complexity of structure, accompanied by repeated integration of lower units to form higher ones, so it gradually acquired new

properties, new methods of energy exchange. Each new product of integration was something more than the mere sum of the integrated units, and exhibited a characteristic behaviour of its own. At a certain stage of evolution, marked by the appearance of those extremely complex chemical substances which we call proteins, matter began to exhibit those particular energy relations which we have agreed to consider as distinctive of living things. One of the results of these complex energy exchanges between living matter—"protoplasm"—and its environment has been the further integration of units to form individual organisms, and the maintenance of its individuality, in spite of the disruptive tendencies of the environment, is, as Dr. Haldane rightly points out, one of the most distinctive features of the organism.

Dr. Haldane lays much stress upon the relativity of vital phenomena. The organism and its biological environment are inseparable, and exist only in relation to one another. To say, however, that life is not localized within the living structure of an organism appears to involve an extension of our ideas of life that would take us outside the customary limits of biological science. But, as we have already indicated, it is impossible to divide the field of knowledge into self-contained allotments. The chemist and physicist are concerned primarily with the inorganic world. The biologist is concerned with the world of living organisms, but he is bound to make use of the methods and interpretations of chemistry and physics to the very limit of their applicability. The speculations of the metaphysician must be based upon the results accumulated in all departments of science.

SCIENCE IN THE ARMY.

THE appointment of Sir William Leishman to be the Director-General of the Army Medical Service is interesting, and one on which the Service and its Medical Corps is to be heartily congratulated. Sir William Leishman had active war experience as a young man during an Indian frontier expedition, and in the great war as Adviser in Pathology in France, until he was brought home in April, 1918, to occupy a similar position in this country. But it is as a pathologist and man of science that he is known and honoured by the profession. It was in 1900 that he found the parasite now named *Leishmania donovani* in films taken *post mortem* from the spleen of a soldier who died in Netley from kala-azar contracted in India. Leishman did not publish his discovery until 1903, in which year Lieutenant-Colonel Donovan, I.M.S., observed the same parasite in blood obtained by splenic puncture during life. The discovery has revolutionized ideas with regard to kala-azar, a disease which during the last sixty years has spread widely in India. Sir William Leishman has also done important work with regard to tick fever, due to the organism of *Spironema duttoni*, conveyed by the tick *Ornithodoros moubata*. Finally, to make a long story short, we may note that his name is widely known as the deviser of a chromatin staining method, which is in general use in laboratories throughout the world. His position in the world of science is shown by the fact that he was an original member of the Medical Research Committee, now the Medical Research Council, and that he was elected F.R.S. in 1910, at the comparatively early age of 45. When Directorates of Hygiene and Pathology were created within the Army Medical Department—a change effected by Sir John Goodwin in order that the Army Medical Service should cease to be divorced from current thought in pathology and preventive medicine—Leishman was obviously indicated for the appointment of Director of Pathology. It was frankly stated at the time that the Department was intended to furnish inducement to officers who had specialized in pathology to continue their work therein. Sir William Leishman's appointment to be Director-General is striking evidence of the determination to pursue this wise policy; evidence also that in the military services of the country, as well as in the civil profession, a man who will devote himself to science may attain to the highest position in the special department of medicine to which he gives himself. The Secretary of State for War may rest assured that his action is not only warmly approved by the civil profession, but will be a distinct encouragement to scientific workers in medicine.

TOOTH STRUCTURE AND DENTAL DISEASE.

IN July, 1921, the Medical Research Council, in consultation with the Ministry of Health, appointed a committee, with Professor Halliburton as chairman, for the investigation of the causes of dental disease. The committee was asked to advise the Council upon the research work in this subject already aided by the Council and to initiate further researches. In presenting its first report on the structure of teeth in relation to dental disease,[1] the committee indicates its intention to issue reports upon other parts of the subject from time to time as completed. Mr. Howard Mummery, to whom this report is due, has considered his subject in three aspects: First, variations in the composition and structure of enamel and their relationship to dental caries; secondly, the production of artificial caries; and thirdly, arrested caries. Under the first heading he inquires whether enamel is entirely inorganic, and whether it is incomplete at the time of eruption and capable of further consolidation from without. Owing to the difficulty of microscopic examination of enamel, there are wide divergencies of opinion. Tomes is quoted in support of the view that there is no organic matter in enamel, whereas Lovatt Evans holds that there is 1 to 2 per cent. The reporter, unfortunately, attempts no explanation of these divergent findings. In discussing the second question he quotes one experimenter (Head) as of opinion that progressive consolidation may occur from dialysis of lime salts through Nasmyth's membrane, and another experimenter (Pickerill) as unable either to confirm or refute the experiments on which this opinion is based. The possibility of further consolidation from within, on the same lines as that seen in the enamel of sargus, the reporter thinks is indicated by certain microscopic appearances of the amelo-dentinal junction—spindles and bundles of apparent fibrils which take a stain. The possibility of further consolidation of the enamel after eruption of the tooth may prove of great import in the prevention of dental caries; Mr. Mummery's attitude is non-committal, and does not inspire much hope. From the report it is not easy to gather what variations are considered normal and which are defects, but the impression given is that if the teeth are kept clean the variations are all immaterial. The report on the production of artificial caries is chiefly historical. It is short, but brings into prominence the chief workers in this field, giving honour where honour is due. The important point is that caries "indistinguishable both macroscopically and microscopically from natural caries" has been produced in the laboratory by initiating ordinary food stagnation in the human mouth. The section on arrested caries of the teeth does not seem to warrant the hopeful attitude taken up by some of the lay press. It is pointed out that the stained surface of dentine showing arrested decay is more resistant to acid than unstained dentine, and that beneath this is a "translucent zone" of dentine also more resistant to acids; but it has to be admitted that unless the enamel be removed around and beyond the area of decay, decay will spread laterally in the amelo-dentinal junction, and what is gained in one direction will be lost in another. The comparatively insensitive temporary teeth may lend themselves to this very old treatment of "filing out the decay," but the sensitive permanent teeth present quite another problem. Certain appearances found by Mr. Mummery in sections of decaying enamel suggest that in this tissue also a translucent zone may be formed. The suggestion is that this, like the translucent zone

[1] *The Structure of Teeth in Relation to Dental Disease.* By J. Howard Mummery, C.B.E., D.Sc., M.R.C.S., L.D.S. Medical Research Council Special Report, No. 70. 1922. H.M. Stationery Office. (8vo, pp. 21; 18 figures. 2s. net.)

of dentine, may represent a vital reaction and an attempt to interpose a barrier of more fully calcified tissue to the advancing caries; but Mr. Mummery asks for further investigation before drawing any such conclusion. The report is beautifully and pertinently illustrated, and is provided with a list of references. One reference, however, which might well be of interest to investigators is missing. Where is Rudas's note on the finding of magnetic iron in the enamel of diluvial teeth to be found?

ATMOSPHERIC CONDITIONS IN COTTON WEAVING.

IN Report No. 21 of the Industrial Fatigue Research Board Mr. S. Wyatt describes the investigations he has made on the atmospheric conditions in nine large weaving sheds. The subject is of great practical importance, because of the artificial conditions under which a great deal of cotton weaving is carried on. In order to improve the quality and quantity of the cloth woven the air is humidified by blowing in steam, and frequently the wet bulb temperature is allowed to rise within 2° F. of the dry bulb temperature. The summer observations in humidified sheds showed an average dry bulb temperature of 75°, and a wet bulb temperature of 70°, though in two sheds the average wet bulb was 73.4°. Needless to say, this system of "steaming" has caused many complaints among the weavers, and there have been demands for its complete abolition. Short of this it is clearly the duty of the employers to neutralize the evil, so far as possible, by maintaining good ventilation. Mr. Wyatt made a large number of determinations of the air currents in the sheds by means of the kata-thermometer, and he found there was considerable uniformity in the various sheds, the average velocity, both in summer and winter, being 26 feet a minute. This value compares favourably with the observations made by other investigators in certain industries, such as the pottery industry (potter's shops) and the printing trade, but it is by no means adequate, for the large number of observations made in boot and shoe factories gave a considerably higher figure—namely, 36 feet a minute, on an average. In humidified sheds, therefore, the manufacturers ought to improve the ventilation till the air currents have a velocity of 50 feet a minute, or more, and in so doing they would afford considerable relief to the weavers. In addition to improving the general ventilation it is probable that much can be done by a system of local ventilation. Mr. Wyatt has shown that the air movement in the vicinity of the weaver can be greatly increased by attaching a three-inch strip of canvas to one of the moving parts of the loom.

THE HOME AMBULANCE SERVICE.

THE Home Service Ambulance System, organized by the Joint Committee of the Order of St. John and the British Red Cross Society, has now become well established. It may be remembered that it arose out of the fact that when the war came to an end a large number of motor ambulances which had been in use in France were returned to this country; some of these are still in use, but it has been the policy of the Home Service Ambulance Committee to make renewals whenever necessary. There are now ambulances stationed in forty-six counties in England, and thirteen in Wales; during the last quarter of 1922 seven new ambulance stations were opened, and there are now altogether 320. During the same period four stations were, for various reasons, closed. The steady increase in the number of patients carried in the ambulances at the great majority of stations shows that recognition of the value of the service is spreading, and that medical men are taking advantage of the facilities offered for the removal of patients. There are still, however, a small number of stations where the ambulances carry so few patients that it seems probable either that adequate steps have not been taken to make the existence of the ambulance known, or that local regulations as to the conditions for its use act as a deterrent. The demand for ambulances throughout the country is still so keen that it would not be just to continue the loan of cars to localities in which they are not used to the fullest extent possible, and the Committee, in such cases, has no alternative but to ask county directors to close the station so that the ambulance may be transferred elsewhere. The Committee fully appreciates the fact that good and efficient service has been done at a great number of stations where, though the work may be spread over a wider area and entails a greater mileage, a smaller number of patients have been dealt with than in such localities as West Lancashire, where since the Service was instituted eleven ambulances have carried over 26,000 patients, and the West Riding, where twelve ambulances have carried nearly 12,000. The total number of cases carried now averages over 50,000 a year. The ambulances are manned by members of the Order of St. John or the British Red Cross Society, and it is intended that any new station shall be in charge of representatives of one or other of these constituent bodies.

X-RAY MEASUREMENT AND PROTECTION.

A JOINT meeting of the Röntgen Society and the Physical Society was held on February 23rd to discuss the physical aspects of the problems involved in the measurement of *x* rays. The demonstrations and papers were concerned chiefly with methods of measuring *x*-ray intensity and with the quality of *x* rays produced by various types of high-tension generators, and therefore scarcely lend themselves to summary in a manner interesting to the ordinary medical radiologist, although of great ultimate importance to him; moreover, as Sir William H. Bragg reminded the audience, it is a long way from the laboratory, where one wave-length can be separated from another, to the treatment room, where a great number of different conditions have to be allowed for, the relative effects of each of which are hard to disentangle. Not very much work, he said, was being done in this country on *x* rays from the physical point of view, for in fact not many physicists were working on *x* rays at all. The contribution of most immediate interest to the medical man was made by two physicists, Dr. G. W. C. Kaye and Dr. E. A. Owen of the National Physical Laboratory, who have been examining a large number of *x*-ray protective materials submitted to the laboratory for test, consequent upon the recommendations drawn up by the X-Ray and Radium Protection Committee (under the chairmanship of Sir Humphry Rolleston) for the better protection and general improvement of the working conditions of the *x*-ray operator. This Committee recommended that the protection afforded by a material should always be referred to in terms of the equivalent thickness of lead. This use of lead as a standard of reference had proved convenient, and gave the approximate accuracy which suffices in practice, when dealing with composite or laminated materials, as the lead values of the several layers could be regarded as additive. When the exciting voltage was over 100,000, the Committee recommended a protection equivalent to 3 mm. of sheet lead, and with exciting voltages below 100,000 a thickness of not less than 2 mm. In modern *x*-ray therapy, as Dr. Finzi observed in the subsequent discussion, the radiations, according to the findings of the physicists, are from 200,000 volts upwards. With these requirements in mind, Drs. Kaye and Owen determined the "lead equivalents" of a variety of materials. The results obtained were for *x* rays generated by 100,000 volts with a tungsten target, but the values hold good over a considerable range on either side of this figure, and are ordinarily diminished by from 5 to 10 per cent. when the voltage is only 50,000. A number of samples of building materials were included in order to discover the protection afforded by the walls and floors of *x*-ray departments. It was found that 1 mm. thickness of bricks or concrete was equivalent to about 0.01 mm. thickness of sheet lead, so that the equivalent of 3 mm. of lead would be a 300 mm. (12 in.) solid concrete floor. The majority of woods had only about one-tenth of the "lead value" of

bricks and concrete, and about 20 mm. (3/4 in.) of steel plate would be required to give a protection equal to 3 mm. of lead. The lead equivalents of baryta plasters, which there is some tendency to use at the present time, were also determined. The thickness of a mixture in equal parts of barium sulphate, sand, and cement would have to be 60 mm. (nearly 2½ in.) to give a protection equal to 3 mm. of lead; the weight of the plaster is nearly three times that of lead. Rather less forbidding results were obtained with another mixture consisting of one-third coarse barium sulphate, one-third fine barium sulphate, and one-third cement. The investigators criticized the open lead-glass bowl used as a container for the *x*-ray bulb. Owing to its design it might afford no protection whatever in certain directions. Such a bowl, in their view, should be provided with some kind of cover and made more effective. For screens or windows glass of the highest lead values was inadmissible on account of the impossibility of producing it in flat sheets free from streakiness and colour. It was necessary to turn to glass of a lower lead content, and which could be obtained in sheets perfectly flat, of great clarity, and almost colourless. The lead value of such glass was only about 0.12 for each millimetre, but as sheets up to 18 mm. thick could be obtained the requisite protection was readily afforded, though the weight was considerable. For aprons and gloves in which lead rubber was employed the Protection Committee recommended a minimum lead equivalent of 1/2 mm.; it was found that 1 mm. of lead rubber was equivalent to a thickness in sheet lead of 0.25 to 0.45 mm. Drs. Kaye and Owen laid stress upon the fact that different makes of lead rubber differed in protective value by 100 per cent. Papers were read also by Mr. W. E. Schall, Dr. F. L. Hopwood, who gave a demonstration of the ondoscope, and others, and Professor Sydney Russ suggested some executive action by the councils of the two societies with a view to setting up an international measure of radiation.

SOCIETY OF RADIOGRAPHERS.

WE have received from the Society of Radiographers a pamphlet setting out the objects of that body. The Society was founded two years and a half ago with a view to giving a definite professional status to those certificated non-medical assistants who work in *x*-ray and electrotherapeutic departments. Its aim is to comprise those approved persons at present working at the subject, and to certify new workers after due training and a strict examination. The constitution of the Society was drawn up by a joint committee containing representatives of the British Association for the Advancement of Radiology and Physiotherapy; of the Institution of Electrical Engineers; and of radiographer-assistants themselves. By general consent the term "radiologist" has come to be applied to members of the medical profession who undertake radiographic diagnosis, and treatment by means of *x* rays and radium; while the term "radiographer" denotes their trained non-medical assistants. It is laid down in the constitution of the Society that its members shall not undertake treatment in any shape or form except under the direction of a qualified medical practitioner, thus conforming with the spirit of a resolution of the Council of the British Medical Association passed on October 24th, 1917: "It is not desirable to encourage the practice of medical radiography by lay persons, except under the direct instructions and supervision of medical practitioners." Paragraph 27 of the constitution of the Society of Radiographers, which runs as follows, seems sufficiently explicit: "No non-medical member (i.e., no member who is without the qualifications entitling him to practise in Great Britain or Ireland as a physician or surgeon) shall accept patients for radiographic, radioscopic, or therapeutic work except under the direction and supervision of a qualified medical practitioner, and any breach of this regulation shall be deemed conduct unfitting the member guilty thereof to remain a member of the Society." The Society now numbers some 120 members. It is governed by a council comprising members of the three bodies from whom the joint committee was formed. The president is Sir Archibald Reid, superintendent of the *x*-ray department of St. Thomas's Hospital; the vice-presidents are Dr. Robert Knox, honorary radiologist to King's College Hospital, and Mr. C. H. Wordingham, formerly president of the Institute of Electrical Engineers. An examination in the practical and theoretical side of the work is held twice a year, successful candidates receiving the diploma of member (M.S.R.). Hospitals are invited to co-operate with the Society in maintaining a high standard of technical efficiency by employing only duly qualified persons as assistants in their *x*-ray departments. An information bureau has been formed in order to bring together radiographers and institutions needing their services. Communications may be addressed to the Secretary, Society of Radiographers, 12, Stratford Place, W.1.

THE WREN CELEBRATION.

WE refer elsewhere to Sir Christopher Wren's observations on physiology, which were of very considerable originality and importance; we will here only briefly mention the ceremonies which have taken place this week to commemorate the second centenary of his death. One of these, and perhaps the most striking, was the service at St. Paul's Cathedral on Monday, which was attended by many representatives of the City of London, of architecture and art in general, and of the medical profession. After a short service a procession was formed to the crypt, where Mr. Paul Waterhouse, President of the Royal Institute of British Architects, laid a wreath on the tomb, and M. Augustin Rey, on behalf of the Société Centrale des Architectes Français, deposited a bronze palm; a wreath was sent by the French Société des Architectes Diplomés. A representative of the American Embassy in London also laid a wreath on behalf of the Architectural League of New York. The Dean of St. Paul's then gave a short address. He began by saying that those present had assembled to do honour to one of the greatest of Englishmen, in a building which was the greatest triumph of his generation. Wren's building had accumulated more glorious memories than Old St. Paul's, because that was the centre of a little country, whereas Wren's St. Paul's was the metropolitan cathedral of the greatest empire in the world's history. Among those who attended the ceremony was the President of the Royal College of Physicians, and it may not be out of place to recall that the house of the College of Physicians contains at least one remnant of Wren's work. The home of the College in Amen Corner was destroyed in the great fire of London, and the new house in Warwick Lane was designed by Wren. Dr. Baldwin Hamey, who contributed liberally to the funds for the rebuilding, defrayed also the cost of wainscoting the coenaculum with fine Spanish oak, presenting fluted pilasters, ornamented capitals, and elegantly carved cornices. In 1820 Wren's building had become not only inconvenient, owing to its situation, but had fallen into dilapidation, and Sir Henry Halford, who was elected president in that year, brought about the removal of the College in 1825 to the building it now occupies in Trafalgar Square. Care was taken to remove part of the wainscoting given by Hamey, and it now furnishes the Censor's room. Although there is no positive evidence, the opinion of experts, and the fact that Wren was in the habit of employing Grinling Gibbons, combine to make it almost certain that the carving is by Gibbons.

TREATMENT OF OPHTHALMIA NEONATORUM IN LONDON.

IN the report of the Departmental Committee on the Causes and Prevention of Blindness attention was drawn to the different practices adopted in Liverpool and London for the reception of mothers and infants when the infant suffered from ophthalmia neonatorum. Liverpool arranged for the reception of the patients in one of the existing voluntary hospitals, in London a special hospital was set up by the

Metropolitan Asylums Board, the St. Margaret's Hospital. The departmental committee thought there was some disadvantage in a special hospital, which may come to be regarded as primarily associated with venereal disease, with a consequent unwillingness on the part of some mothers to enter such an institution. Further, it was thought that a single hospital in London was not likely to be sufficiently known to practitioners and people. For these reasons it was considered that in London it would be advantageous that hospital accommodation should be provided by securing beds in a few of the well known teaching hospitals in centres convenient to the great masses of the population. There would be a further advantage in such an arrangement, in that students attending the practice of these hospitals would become familiar with the care and treatment of these cases, which they will not readily do if provision is made at one special hospital alone. We have now received from Mr. M. S. Mayou, F.R.C.S., the statistics of the number of cases notified in the metropolitan area and the number admitted to St. Margaret's Hospital, which is situated close to the Kentish Town Station of the Midland Railway:—1919: cases notified, 870; cases admitted, 281. 1920: cases notified, 1,186; cases admitted, 252. 1921: cases notified, 1,076; cases admitted, 213. 1922: cases notified, 866; cases admitted, 213.

DISTEMPER RESEARCH COMMITTEE.

As has already been announced, the Medical Research Council has undertaken to organize an investigation into dogs' distemper, towards which funds will be provided by the *Field* Distemper Council. Researches will be conducted by members of the Medical Research Council's staff, partly at the National Institute for Medical Research, Hampstead, but more particularly at the new farm laboratory, for which a site near London has recently been acquired. As opportunities arise and suitable assistance can be secured, inquiries co-ordinated with these will be promoted at other centres of work. These investigations will also be brought into relation with other studies in human and animal pathology. The Medical Research Council has appointed the following scientific committee to advise on the subject and to direct the investigations: Sir William B. Leishman, K.C.M.G., C.B., F.R.S., Director of Pathology, War Office, and a member of the Medical Research Council (Chairman); Mr. J. B. Buxton, F.R.C.V.S.; Captain S. R. Douglas, F.R.S., National Institute for Medical Research; Professor F. Hobday, C.M.G., F.R.C.V.S.; and Dr. C. J. Martin, C.M.G., F.R.S., Director of the Lister Institute. Other members may be added later as the programme develops. A member of the Council's staff will act as secretary to the committee, and communications upon any scientific questions should be addressed to the Secretary, Distemper Research Committee, 15, York Buildings, Adelphi, W.C.2.

OSWALDO CRUZ.

DR. BELISARIO PENNA has fitly chosen the first centenary of the Independence of Brazil for the publication of his recollections of Oswaldo Cruz, whose disciple he was. Cruz, perhaps the most illustrious of Brazilian men of science, died of Bright's disease in 1917 at the early age of 44. For fifteen years he laboured incessantly in the domain of sanitary science, and to him Brazil is indebted for its rapid emancipation from yellow fever. As director of the Brazilian Public Health Service he stamped out this disease in less than three years, and was equally successful in dealing with yellow fever in Para, the principal seat of the rubber industry on the Amazon. He also carried on a vigorous campaign against plague, malaria, and small-pox, which were very prevalent throughout the country. In 1900 he founded an institute for bacteriology and serum therapy, to which in 1908 the name Instituto Oswaldo Cruz was given. It is one of the finest institutes of parasitology in existence, and its proceedings, which are issued annually in Portuguese and French, are well known to biologists throughout the world. By means of this institute Oswaldo Cruz was able to found a school of hygienists and workers in experimental medicine, of whom the best known is probably Carlos Chagas, who discovered the cause of chronic infective thyroiditis. Dr. Penna has reproduced a number of portraits of Oswaldo Cruz, but does not attempt to give any continuous narrative, contenting himself with a collection of extracts from articles, lectures, and addresses; but we sympathize with his fervid panegyric of this great Brazilian scientist.

THE Council of the Royal Society of London has recommended fifteen persons for election into the Society: they include Dr. E. D. Adrian, University lecturer in physiology, Cambridge; Dr. Edward Fawcett, professor of anatomy in the University of Bristol; Dr. R. T. Leiper, professor of helminthology in the University of London, and Director of the Department of Helminthology in the London School of Tropical Medicine; Dr. J. J. R. Macleod, M.B., Ch.B.Aberd., professor of physiology in the University of Toronto. Among the other names are those of Dr. Guy Marshall, Director of the Imperial Bureau of Entomology, and Sir Douglas Mawson, D.Sc., who led the Australasian Antarctic expedition, 1911–14.

THE Section of Medicine at the Annual Meeting of the British Medical Association, to be held this year at Portsmouth, will meet on Wednesday, Thursday, and Friday, July 25th, 26th, and 27th. The Committee of the Section, of which Sir Thomas Horder is president, has decided that the subject to be discussed on the first day shall be diabetes; on the second day there will be a discussion on the etiology and treatment of heart disease in early life, with a special view to the prevention of chronic cardiac insufficiency; and on the third day a discussion on chronic bronchitis.

Medical Notes in Parliament.

[FROM OUR PARLIAMENTARY CORRESPONDENT.]

Pension Medical Services.

TRIBUTE BY THE MINISTER OF PENSIONS.

MAJOR TRYON, the Minister of Pensions, made an important speech on February 20th in meeting a motion in the House of Commons for a Select Committee of inquiry into the work of the Pensions Ministry. The motion was submitted on behalf of the Labour party by way of amendment to the address by Mr. Adamson, who traversed familiar ground; a number of other members raised points of criticism, but did not make any personal reflections on the medical services.

The Minister of Pensions spoke first of the enormous medical responsibility of his Department for the care of the sick and wounded. The nation, he said, owed a great debt to the medical profession and the hospital staffs for what they had done, and he was sure the House would feel that no expenditure could be devoted by the country to a better purpose than to the restoration as useful citizens of those who had been disabled in the great war.

Definitions of Terms.

To clear up misconceptions that might still obtain, Major Tryon recapitulated primary definitions. He reminded the House as regards the term "entitlement" that the grant of pensions was made entirely irrespective of what employment a man might get. The entitlement was simply the right of compensation for the disability suffered. "Assessment" was the measuring by medical authorities of the extent of the disablement, comparing it with the condition of a normal healthy man of the same age. It was expressed in percentages. There was no other way in which assessment could be made. In respect to the pensions scale or rate, he was sometimes told that the Government had not done its duty to the ex-service men. Before the war an ex-service man, totally disabled, with a wife and two children, cost 17s. 6d. Now in such case the scale provided was 63s. 6d.

Appeal Tribunal.

The ex-service men had demanded and maintained the demand that the question of entitlement, whether the injury was due to the war or not, should be settled by some impartial tribunal—should be taken absolutely out of the hands of the Ministry of Pensions—and that was why the Lord Chancellor's Department had been chosen to set up

a number of these tribunals for entitlement. They consisted of a lawyer of seven years' standing, an ex-service man, and a doctor. He did not know of any other country in which the decision vitally affecting State funds was thus taken away from the control of State officials and put in the hands of three persons who could absolutely decide the issue.

The Medical Boards.

Statements had been made that secret instructions had been issued to these Boards to cut down pensions. A Departmental Committee upon which were representatives of the three great ex-service men's organizations, a member of the Labour party, members of every other party in that House, and representatives of the local voluntary workers, had thoroughly investigated the allegation, and they unanimously agreed that there was no truth in it. Members of Parliament frequently quoted cases where Medical Boards cut down the rate of pensions, but said nothing about those of enlargement. The main justification, in his opinion, for the Medical Boards in the last year or two had not been any reduction that might have been effected, but the fact that as some men were getting better and some men were getting worse, it was necessary to make adjustments. If these men were not examined, simplicity would be obtained at the cost of the men who were getting worse. The country would be spending its money, not on the men who were getting worse, but on those who were getting better. Over the whole range of cases the effect of the work of the Medical Boards had been remarkable. About two years ago, taking the increase in respect of cases getting worse, and the decrease in respect of those getting better, the net reduction of assessment by the Medical Boards was 6 per cent. A little time ago the net reduction, as the result of the service of the Medical Boards, was 4 per cent. The net reduction of assessment to-day was 3½ per cent. The lesson of these figures was that the Ministry was right when in 1921 it introduced the Pensions Bill of that date giving increased powers to grant final awards, because it was found that about 50 per cent. of the cases examined showed no change. The advantage of the power to grant an increased number of final awards was that the pensioner with his affairs thus settled felt that his pension was safe for the rest of his life. At the present time final awards were being made at the rate of 4,000 a week.

Cost of Administration.

A Departmental Committee had sat for seven months in order to ascertain what could be done in reasonable economy. The Medical Subcommittee introduced the system of clearing houses for the sick and wounded. The result was a saving of time, a lessening of the waiting list, and great financial economy. A saving of £250,000 was also made by reducing the number of doctors on Medical Boards from three to two. Legislation would be proposed this session under which a pensioner, instead of having to produce a life certificate every three months, would have to do so every six months only. That would get rid of an enormous amount of trouble to all concerned, and would save about a million a year in expenses of the issue office. Finally, in this connexion, Major Tryon mentioned with satisfaction that the cost of administration, apart from medical administration of medical service, was down to as low a rate as 9d. in the £. Moreover, 97 per cent. of the male staff were ex-service men, and that, he thought, met any suggestion that there was want of sympathy in the Department.

Medical and Surgical Work.

Major Tryon regretted that he had not more time to speak in detail of the medical and surgical work, but he gave some striking information. Since the armistice the Ministry had spent over £60,000,000 on the medical treatment of the sick and wounded of the great war, and in allowances for the men and their families while the treatment continued. The nation would, he felt sure, be grateful to the medical profession and hospital staffs for the remarkable results achieved. A large proportion of the patients had been restored to health and had resumed their civil occupation. At the present time the Ministry was responsible for—

A daily average of 25,000 patients in hospital (of these, 12,000 are in hospitals owned, managed, and staffed exclusively by the Ministry);

A daily average of 80,000 patients attending as out-patients at hospitals or clinics (of whom the larger number are attending clinics owned, staffed, and controlled exclusively by the Ministry);

Over 1,000,000 cases of treatment have been given by the Ministry in the past three years.

It must not be supposed that these cases simply went under treatment and came out again as quickly as possible. It was the aim of the Ministry's medical service to continue treatment so long as there was the smallest chance of material improvement in the man's condition. As an illustration of the care taken he mentioned that he had recently had an investigation made into a batch of 2,000 cases, and had found that 40 per cent. had been receiving treatment, whether as in-patients, out-patients, or at home, at the expense of the Ministry, for eighteen months and over. They were cases, many of them, of gunshot wound, requiring orthopaedic treatment; some were tuberculous; many were neurasthenic. The medical service of the Ministry was not only the largest of its kind, but was by far the most comprehensive in technical equipment. The work done in the Ministry hospitals—for example, for surgical cases by orthopaedic treatment—was far ahead of anything else in the country in comprehensiveness. He had had an analysis made recently of 1,000 cases taken at random of the discharged from hospital during the last twelve months. The figures came out as follows:

General medical and surgical cases—118 out of 224 were discharged as completely recovered.

Tropical disease cases (dysentery, malaria, etc.)—51 out of 55 men discharged were either recovered or greatly improved.

Orthopaedic cases—185 out of 452 were discharged as recovered and 199 were discharged as greatly improved.

The treatment and handling of ex-service men suffering from nerve or brain trouble had been constantly under discussion between himself and representatives of ex-service men. There were three points on which they were specially concerned—the hope of cure for those already in asylums, the efforts being made to save border-line cases from having to be certified, and the restoration to health and usefulness of the mental and nerve cases. His predecessor and himself had realized fully the importance of this question, and had gone a long way to meet it. The Ministry had fourteen neurological hospitals and a large number of neurological clinics. These were staffed with the best experts, and the special emphasis which the Ministry had given to this branch of treatment had actually led to a very great increase in the number of such experts, many of whom would not have taken up this class of work but for the training given in Ministry hospitals. The Ministry had actually by its neurological work in hospitals and clinics prevented a very large number of cases becoming certified. In these hospitals and clinics every class of case was dealt with, from the slightly neurasthenic to those on the border-line, and efforts in treatment did not cease until a definite cure or substantial improvement wherever possible was shown. In one neurological hospital devoted to the most serious cases, out of 134 treated during 1922 only nine had eventually to be certified as insane; of the remainder, 68 were discharged recovered, and twelve were transferred to other institutions, including some for industrial training. At another Ministry hospital, out of 300 cases treated during the twelve months, 246 were discharged medically reported as recovered, and it was known that 121 got employment at once, while some of the remainder were transferred to the Ministry of Labour for training, or, with the help of the War Pension Committee, were given grants to set up in business. Between 1,500 and 1,600 cases passed through the neurological hospitals in a quarter. Of these on an average 20 per cent. were discharged fully recovered. He thought that the medical staff might find great pleasure in the photographs sent in token of gratitude from men who had appeared shattered wrecks, but had now emerged into civil life—to be useful citizens and happy men. Some of the best treatment given had been in teaching the man a trade—not necessarily a trade that he would follow, but for its value in curative effect.

In conclusion, Major Tryon announced that the Ministry was going to start as an experiment separate arrangements for the treatment of selected certified cases of a hopeful type. The Government felt that the experiment was well worth making. A beginning would be made tentatively with one or two small establishments, and steps were being taken to start at an early date. In thanking Members of Parliament for the help they had rendered to the Ministry, Major Tryon said this was a nation's debt, and it should be the duty of all parties in the State to assist in meeting it. The division showed a majority of 131 for the Government, the amendment being rejected by 307 votes to 176.

Institutions for Mental Defectives.

In Committee of Supply, on February 21st, a token supplementary vote of £10 was proposed in respect of work being undertaken in the enlargement of the Rampton Institution for Mental Defectives. Sir John Baird explained that the provision was for defectives who had violent propensities. The existing building accommodated 220 males and 148 females. The scheme was for the erection of an additional unit to accommodate 90 persons and additional nurses, and cottages for the married staff. Three years would be required to carry it through. The administration was by the Board of Control.

In the course of discussion several speakers suggested that it would be better to have several small buildings rather than one large institution, and Mr. Pringle recalled previous estimates for

this institution; in 1921–22 there was one for £35,700 for a new female wing; in the following year the expenditure upon a wing for patients and on improved accommodation for nurses reached £51,200. There was now a further estimate amounting to £109,000. Sir John Baird admitted the existence of a difference of opinion among experts as to the relative value of treatment in large and in small institutions. The Board of Control was of opinion that an institution such as that under discussion was best adapted for the purpose. Dr. Chapple inquired whether the Minister had exhausted the possibility of using some of the derelict buildings to be found all over the country. He knew of one that cost over £100,000 to build, that had been comparatively recently bought by the Government, which was anxious now to sell it for £20,000, but there was no offer. He disagreed, however, with those who denounced institutional treatment, and thought it was generally desirable.

Sir Sydney Russell-Wells said that if there was one lot in life deserving commiseration more than another it was that of the man, woman, or child who came within this class of mental cases. Any attempt to interfere with the treatment of such persons, or to lessen the facilities for dealing with them, was to be deprecated, for such treatment was a benefit not only to the sufferers but to the nation. The saving of abuses was far more likely to be achieved in large than in small institutions, for the large had greater facilities for classifying, grading, and arranging the inmates. He asked members to recall villages in the country where in days gone by—perhaps even now—there was a village lunatic who was the butt of the children. Was it suggested that a poor wretch of this sort would not be better off in an institution? Such a place was better than the patients' own homes or a small institution. A great deal more money might be spent in adapting existing buildings than in providing new. Possibly mental deficiency was the most frequent cause of abnormal and extraordinary crime. Persons had been sentenced as criminals when they ought to have been treated as mental deficients. The vote was carried by 248 to 132.

Voluntary Hospitals' Grant.—Sir W. Joynson-Hicks informed Mr. Gilbert, on February 21st, that the whole of the sum of £500,000 granted to the Hospital Commission had not yet been distributed. The Commission allocated £225,000 to hospitals in London, and the whole of that money had been distributed. The sum of £275,000 was allocated to the hospitals outside London. Of this £181,318 had been paid to date, and the Commission intended shortly to consider the distribution of the balance after the claims in respect of the 1921 deficit had been met. The Commission had not yet made any recommendations as to the continuance of State assistance after the grant was exhausted. Full information in regard to the work of the Commission was contained in the interim report which was being issued that week. The Ministry of Health had no responsibility for the combined appeal for the hospitals in London, but it had been informed by the organizing committee that it was not yet possible to state exactly the total sum contributed to the combined appeal. The sum actually paid in to the organizing committee amounted to £392,100, of which £260,000 had been contributed. But large additional sums had yet to be received from two schemes which were still open.

Medical Treatment for Ex-service Men.—Viscount Windsor asked, on February 21st, whether the Minister of Pensions would make arrangements in country districts—in order to obviate the long delay and physical injury which were often entailed—for ex-service men to be examined and treated by a local medical practitioner instead of having to apply to the local Ministry of Pensions office in the event of recurring illness. Major Tryon said it was the recognized duty of a local insurance practitioner to refer a patient to the local office of the Ministry if he considered that the man required special treatment of any kind for a war disability. It was competent for any disabled ex-service man to apply direct to the local office of the Ministry for this purpose.

Institutions for Tuberculous Patients.—On inquiry by Mr. Briant, Sir W. Joynson-Hicks stated, on February 21st, that the institutions approved by the Minister of Health for the treatment of tuberculosis in England, apart from Poor Law institutions, contained 19,240 beds. Of these, 3,310 were in children's institutions, but the remaining 15,930 were available for insured persons, although since the termination of sanatorium benefits no beds were specially reserved for such patients.

Spahlinger Treatment of Tuberculosis.—Captain W. Benn asked the Minister of Pensions, on February 20th, whether his attention had been called to the Spahlinger treatment for tuberculosis, and whether it was intended to make it available for ex-service patients. Sir W. Joynson-Hicks, in reply, said that the Minister of Health was informed that no supplies of M. Spahlinger's remedies were yet available in this country. When they became available it would be open to the medical officers responsible for the treatment of ex-service men to utilize these remedies in the treatment of their patients if they considered it desirable.

Legislation as to Mental Treatment.—Mr. Griffiths asked, on February 26th, whether a bill would be brought forward this session to extend to other local health authorities the powers already conferred by the Public Health Act, 1875, on borough councils to conduct hospitals for any class of illness, including early uncertifiable cases of nervous breakdown; and whether, in view of the urgent need for hospitals of this description unconnected with lunacy administration and free from detention, the Minister of Health would extend the grant to enable councils to maintain such hospitals, with a view to the reduction of the £7,900,000 now spent annually in keeping up asylums. Sir W. Joynson-Hicks said that the question of introducing legislation with regard to mental treatment was receiving the consideration of the Government.

Visitations to Mental Hospitals.—Requested on February 26th to take steps to see that Section 79 of the Lunacy Act was posted up in the waiting room of asylums, Sir W. Joynson-Hicks said that all mental hospital authorities had been asked to set out the effect of Section 79 of the Act in the regulations as to visitation which were sent to friends of patients. The Board of Control considered this preferable to putting up a notice in the waiting room.

Health Insurance: Medical Benefits.—Sir Kingsley Wood asked, on February 20th, whether in view of the expiration of the agreements at the end of this year with doctors on the panel list, the Minister of Health was taking steps to review the present scheme of medical benefits with a view to rendering it more efficient and economical. Sir W. Joynson-Hicks said that the existing arrangements were now being examined in detail by the Insurance Consultative Council of the Minister of Health.

Maternity Service and Child Welfare in Scotland.—Captain Elliot informed Mr. Sullivan, on February 22nd, that the amount of Government grant paid in relief of local authorities' expenditure in Scotland under schemes of maternity service and child welfare, in each local authority financial year ending in May, was in 1919–20 £64,692, in 1920–21 £90,532, and in 1921–22 £235,832. The gross expenditure of local authorities in each year would be almost exactly double the amount of grant. The figure given for 1921–22 was an approximation. The very large increase of grant in that year was due in the main to the increased supplies of food and milk given by local authorities, the cost of which amounted to more than half of the total expenditure. The grant for 1922–23 could not yet be stated, but it was not expected to exceed £111,000.

The Registration of Nurses.—Mr. Briant asked, on February 21st, if the proposals of the Nursing Council included the registration of nurses with less than one year's hospital training; and if in the interests of the public, who regarded registration as a guarantee of efficiency, the Minister of Health would refuse to consent to such reduction in the standard of nursing. Sir W. Joynson-Hicks said that the Council had submitted a rule which had for some time been in operation in Scotland, to give it a discretion in exceptional cases to admit nurses with less than one year's training. The Minister had asked the new Council to reconsider this proposal, and until its reply was received it would be premature to make any statement.

Unemployment and Sickness.—Questioned by Mr. Somerville, on February 21st, whether there had been increase of sickness from lack of sufficient nourishment, Sir W. Joynson-Hicks said the latest figures available as to the expense of sickness amongst persons insured under the National Insurance Acts indicated that the aggregate amount of sickness during the past year fell short of the expectations on which the Acts were based, and also of the experience of any pre-war year. So many factors affected the total expenditure on sickness benefits that it was impossible to assign variations in that figure to particular causes. But there was no direct evidence of an increase of sickness for the reason stated by Mr. Somerville.

Sale of Liquor to Young Persons.—Lady Astor's bill, entitled Intoxicating Liquors (Sale to Persons Under Eighteen) Bill, will come up for second reading in the House of Commons on March 9th, when it will have first place. The measure proposes to prohibit the sale of any intoxicants to anyone under 18. As the law stands now, any child over 14 may buy intoxicants, but none can buy spirit until reaching 16 years of age. It is claimed that this bill is not essentially a temperance measure, but is promoted with the support of teachers in the interest of adolescents.

Vaccination of Army Recruits.—Lieut.-Colonel Guinness, in answer to Mr. Leech on February 21st, said that no recruit for the Regular Army was enlisted unless he signed the attestation paper, in which he undertook the obligation to be vaccinated or revaccinated. If a recruit subsequently refused to fulfil the obligation, it had always been the practice to discharge him without gratuity on the ground that "his services are no longer required." This system had not been changed, but the wording of the regulations had been amended, and the cause of discharge was now more exactly defined as "refusal on the part of a recruit to carry out the agreement to be vaccinated or revaccinated entered into on enlistment." The rule applied to all regular recruits without exception, but not to recruits for the Territorial Army.

Vaccination in Germany.—Mr. Sullivan asked a question, on February 22nd, as to a statement in a pamphlet issued by the Ministry of Health which attributed the compulsory revaccination laws which existed in Prussia since 1834 to the year 1874, that being the year in which the Prussian laws were re-enacted for the new German Empire, thus concealing the fact of a serious outbreak of small-pox under conditions of strict vaccination. Sir William Joynson-Hicks said that the statement in the pamphlet was correct. The Prussian law of 1834 referred only to soldiers in the Prussian army. Compulsory revaccination for the civil population in Prussia and the rest of the German Empire was first enacted in 1874. There was, therefore, no ground for suggesting that the pamphlet should be withdrawn.

Vaccination Deaths.—Sir W. Joynson-Hicks stated, on February 26th, in reply to Mr. Snowden, that during the year 1921 "vaccination" was mentioned on seven certificates of death and "general vaccinia" on one. They were classified as follows: 3 to vaccination, 3 to erysipelas, 2 to purulent infection, septicaemia. The eight cases were all of children under 1 year.

Nova et Vetera.

THE FOURTH OF MARCH: A DOLEFUL ANNIVERSARY.

THE Christian Calendar, as it used to be observed, was a chronicle of joy. Though the commemorations were usually of a death, the attention of the faithful was directed to the triumph of the soul rather than to the trials and sufferings of the body. Thus each succeeding day was meant to be a fresh link in a glad chain whereby the wide world everywhere was bound around the feet of God. It was this aspect of the celebrations as much as a different theology that constrained the Puritan to their abolition. It was this, too, which preserved the few that remain to an unbelieving generation, which observes them as holidays and cares not to remember that they were also meant to be holy days. But the power of the Puritan is past, and rule is now divided between the Hedonist and the Pessimist. Should the last named ever come into his kingdom we may expect a new calendar, a calendar of calamities, in which each day will be a fresh stimulus to the remembrance of past and present evils. In such a mournful menology the fourth of March must hold a bad pre-eminence if, as many are convinced, it is the anniversary of the first appearance of syphilis in Europe. But that little word "if" conceals a sea of troubles, for the literature upon the origin of this disease is immense, very animated, not to say venomous. "Bone Deus," wrote one of the disputants in 1789, "quot sunt illico factae medicorum concertationes, digladiationes, discordiae!" Happily to-day the sounds of strife are stilled and one may venture, with all submission unto maturer discernments, to outline the argument for the fourth of March.

Whatever judgement may be passed upon the alleged proof of the existence of syphilis in prehistoric man, there can be no doubt that to the practitioners at the end of the fifteenth century it was a new disease. Classical and mediaeval literature has been passed, as it were, through a fine sieve, but no unequivocal reference to it has been discovered. The medical lore of the past has been searched with zeal even greater, but in the result equally futile. Syphilis staggered the doctors of that day out of their medical catechism. In presence of the "Veneris monumenta nefandae" they recognized the "inextricabilis error" of the maze they had been treading, and found the thread that ultimately guided them into a new world untrammelled by authority. By the year 1500 the portent had appeared in every country of Europe. In the British Isles the first notice comes, curiously enough, from Aberdeen, where, on April 21st, 1497, the town council issued regulations "for the eschevin of the infirmitey cumm out of Franche and strang partis." Six months later, September 22nd, Edinburgh was forced to take measures "for the eschewing of the greit appearand danger . . . fra this contagious sickness callit the Grandgore." Both these documents agree with other early notices from Northern Europe in attributing the new disease to France.

In France various notices of earlier date are available, but the edict issued in Paris on March 6th, 1497, is of special interest because of its opening words:

> "Pourceque en ceste ville de Paris y avoit plusieurs malades de certain maladie contagieuse nommee la grosse verole, qui pui deux ans en ça a eu grand cours en ce Roiaume, tant de ceste ville de Paris que d'autres lieux."

Without reading a too strict chronology into this document it is safe to say that the disease had not been evident to the public before March, 1495. We learn also from Lyons and elsewhere that the outbreak in the locality was due to the advent therein from Italy of soldiers suffering from it. Of the famous expedition of Charles VIII into Italy much has been written, but a few piquant phrases from Dr. Pangloss must suffice here:

> "Personne n'ignore combien cette expédition fût inutile et brillante. Nos chevaliers y développèrent l'héroïsme le plus admirable et le plus infructueux. Ils prirent avec rapidité Milan, Florence, Rome, Naples et—la grosse vérole. . . . Ce fut à peu près l'unique fruit . . . d'une campagne si glorieuse."

A few dates will fix the sequence of events. Leaving Lyons with his army in August, 1494, Charles crossed the Alps on September 2nd, and after being laid up at Asti with an attack of small-pox he reached Rome on December 31st. He did not enter the kingdom of Naples, the direct object of his enterprise, till February 22nd, 1495. The prize fell into his hands almost without a blow, but he only remained within the territory till May 20th, when his army began the homeward march. But he had been too successful, and this made all the Italian States his declared enemies. Had they been united his doom was sealed. As it was, he had to fight his way back, and even his great victory over the Venetians only enabled him to withdraw the army into France, which was reached in October. Meanwhile Naples had been lost as quickly as it had been gained. The few French troops were shut up within strongholds here and there, but had to surrender one after another, so that the last of them reached France early in 1496. As for syphilis, we have the records of two surgeons in the Venetian army who note its appearance at the time of the French retreat, while the French allege that it first broke out among them when they were in Naples—that is to say, some time after February 20th, 1495.

So far we are on common ground. All are agreed as to the epidemic at Naples and as to the part the French army played in its spread through Italy into France and so to other countries. But what about the disease before February, 1495? The condition of Italy at that time was indeed deplorable. Fracastor has described it in poetic diction but with sober truth:

> Ergo hanc per miseras terras Saturnus agebat
> Pestem atrox, nec saeva minus crudelis et ipse
> Miscebat Mavors, conjunctaque fata ferebat.
> Quippe lue hac nascente, putem simul omnia diras
> Eumenides cecinisse fera et crudelia nobis.
> Tartareos etiam barathro dira omnia ab imo
> Excivisse lacus, Stygiaque ab sede laborem,
> Pestemque, horribilemque famem, bellumque, necemque.

These lines are rendered as follows by Nahum Tate, afterwards Poet Laureate, who published a translation of Fracastor's poem in 1686:

> From hence malitious Saturn's Force is known,
> From whose malignant Orb this Plague was thrown,
> To whom more cruel Mars assistance lent,
> And club'd his Influence to the dire Event:
> Nor could the malice of the Stars suffice,
> To make such execrable Mischief rise;
> For certainly e'er this Disease began,
> Through Hells dark Courts the cursing Furies ran,
> Where to astonisht Ghosts they did relate,
> In dreadfull Songs, the Burthen of our Fate;
> The Stygian Pool did to the bottome rake,
> And from its Dregs the curst Ingredients take,
> Which scatter'd since through Europe wide and far,
> Bred Pestilence, and more consuming War.

If ever the dragon womb of Stygian darkness could beget a plague it was here. Little wonder that the spontaneous generation of syphilis found acceptance. But nowadays one must look for carriers or sporadic cases. The latter no doubt occurred, but were missed because they were sporadic. But whence came the infection to Italy? Benedictus offers a clue: "novus . . . morbus gallicus ad nos ex occidente—irrepsit." Does he refer to Spain? If so the path of infection was easy. A Spanish family ruled in Naples, and their relations with the mother country were intimate. Many Spaniards came to Italy in search of fame or fortune. One of these, Roderigo Borgia, was then seated on the papal throne. Thousands of Jews came thither on their expulsion from Spain in 1492, and they were joined in the immediately succeeding years by numbers of the Marani or cryptic Jews about whose conversion to Catholicism Ferdinand was doubtful. Opportunities for infection from Spain were therefore abundant.

But neither the Jews nor the Moors of Spain are noted as being affected by diseases different from those of their Christian neighbours. One direct piece of evidence we have, however. It is from Roderigo Diaz, who practised for many years in Barcelona and was there when Columbus and his companions after the first voyage to America came to pay homage to their sovereigns (April, 1493). He explicitly states that some of the sailors were affected by the new disease, and that it rapidly spread through the city and thence to Europe. He also adds that the sailors were infected by the natives in Hispaniola. Oviedo is no less emphatic. He was at the Court at Barcelona when Columbus arrived; he had conversations with him then and in after years; he knew personally many of those who accompanied Columbus on his voyages. In 1515 he went to Hispaniola as a government official, had visual corroboration of the presence and frequency of the disease there, and obtained from the natives confirmation of its antiquity among them. Oviedo had no medical training, but the subject was one in which he was much

interested, and he took great pains to ascertain the truth. According to this story, therefore, syphilis accompanied the Spaniards on their first voyage home. They first touched land at Lisbon, where they rested for nine days, passing thereafter to Seville and thence overland to Barcelona. As they landed at Lisbon on Monday, March 4th, 1493, that day may rightly be regarded as "dies Europae fatalis." But if anyone feels too depressed on that sad anniversary he may gather some solace by recalling the event which marked the preceding day, for it was upon March 3rd, 1905, that Schaudinn discovered the spiral protozoon to which he gave the name of *Spirochaeta pallida*.

Fallopius, in speaking of America, said: "Inventum est certe pretiosissimum metallum, inde delata est copia. . . . Sed est etiam adjuncta spina, et aloe melli admista. Detulit enim Columbus triremes Gallica lue refertas." And he was right. But if we robbed America of its precious metal in the past, we have suffered sorely for the wrong. And the end is not yet, since the debt of gold we are burdened to repay at compound interest for many a year to come. The philosophic mind, however, might be tempted to regard this material loss as clear gain if only the Western world would recall from us what it originally bestowed as a spontaneous gift.

G. M. C.

England and Wales.

THE NEW SPIRIT IN PSYCHIATRY.

WE have received from Dr. H. Dove Cormac, medical superintendent of the Cheshire County Mental Hospital, a copy of the report by Dr. C. Hubert Bond, Commissioner of the Board of Control, on his annual visit of inspection to that institution. The concluding sentences of the report are as follows: "The fact that a substantial pecuniary recognition is available here to any member of the medical staff who obtains a diploma in Psycho'ogical Medicine prompts me to express the hope that it will be found possible to bring into activity a school in that subject, which it is understood that the authorities at Manchester University are willing to arrange. I also desire to express my conviction that, could it be found feasible to establish at a general hospital out-patient treatment, to be undertaken by the medical officers here, for mental cases sent by their family doctor, much advantage would be derived thereby, especially towards the prevention and cutting short of cases of mental illness arising in the area served by this hospital."

THE CANCER HOSPITAL, LONDON.

An appeal for funds is being made on behalf of the Cancer Hospital (Free), Fulham Road, London, to commemorate the services to the hospital of the late Sir Charles Ryall. The present operating theatre is no longer adequate for its purpose, and it has been resolved to double the present accommodation. The erection of this new unit will involve other alterations, as existing structures will have to be modified. During the last few years the work of the out-patient department of the hospital has greatly increased and new departments have been opened for medical, dental, and laryngological cases, while new deep-therapy apparatus has been installed in the electrical and radio-therapeutic department. A rearrangement of the out-patient department is, therefore, also necessary in order to make better use of the space available. In 1910 a research institute was erected, but the research work has been limited by the amount which the committee could appropriate for the purpose. It is hoped that a sufficient sum will be raised to provide for the endowment of research, as well as to pay for the structural alterations contemplated in the hospital.

CENTRAL MIDWIVES BOARD.

A meeting of the Central Midwives Board for England and Wales was held on February 23rd, Sir Francis Champneys presiding. Letters were read from the respective bodies informing the Board of the re-election of Sir Francis Champneys, Mr. Leonard Henry West, Mr. John Shields Fairbairn, Mr. Charles Sangster, and Dr. Lyster as their representatives on the Board for the ensuing year. Letters from the Hampshire and Surrey County Councils were considered, and it was agreed to inform the clerks of these councils that the Board does not see its way to prohibit the application or administration of any drugs other than a simple aperient except under proper medical advice, and that it was the intention of the Board to convey this view by the resolution which it passed at its last meeting. A letter had been received from the London County Council with reference to the resolution as to the duty of a midwife to call in medical aid in any case of ruptured perineum which requires stitching passed at the last meeting of the Board, and drawing attention to a letter addressed to the council's medical officer by the Board, in 1918, upon which the council had based its practice of considering the question of a serious rupture upon its merits and not upon the fact that the perineum required to be sutured; also that the council now assumes that any case in which a midwife sutures a perineum should be treated as a case of negligence or misconduct and reported to the Board for decision. It was decided to inform the London County Council that the circumstances under which the letter of 1918 was sent by the Board are no longer in existence and that the local authority should find a prima facie case whenever, in its opinion, the judgement of the Board is required.

A letter was considered from the Medical Secretary of the British Medical Association stating that the Council of the Association is of opinion that midwives should not administer anaesthetics except when they are acting under the direct personal supervision of the doctor in charge of the case, and expressing the hope that the Board will give the matter its serious consideration. It was agreed to inform the British Medical Association that the Board is in agreement with the view expressed in the letter, and that for special reasons only no action was taken in the case to which reference was made.

SUNDERLAND EYE INFIRMARY.

At the annual meeting of the Court of Governors of the Sunderland Eye Infirmary the chairman, Mr. G. O. White, said that there had been a decrease of 504 in the number of cases treated in the institution during the past year, but the number of attendances had increased by 2,515, the total amounting to over 49,000; the number of patients admitted into the infirmary had also increased. There was, he believed for the first time, a deficit of £195 on the year's working, but trade had been very bad. The chairman then made the presentation of a gold watch to Dr. Boyd Cunningham, in recognition of his able and generous services to the institution as honorary surgeon and senior surgeon; it was now thirteen years, he said, since Dr. Cunningham came to the institution, and the work he had done had been most valuable.

Scotland.

EDINBURGH UNIVERSITY WAR MEMORIAL.

THE Earl of Balfour, as Chancellor of the University, last week unveiled the memorial to the students and graduates of the University who fell in the great war. The memorial, which bears over one thousand names, consists of a series of handsome bronze panels let into the wall on the west side of the quadrangle, under the portico where formerly stood the statue of Sir David Brewster, which has now been removed. Above the memorial are sculptured the words, "*Vivere nos doceant qui didicere mori*," and, as the Chancellor said in his brief but eloquent address, "We cannot estimate our loss, but we have lost men who would have been great statesmen, great poets, great writers, great thinkers, leaders in science, leaders in religion, leaders in all social effort." Laurel wreaths and other floral tributes were laid at the base of the memorial by the Principal of the University, the President of the Students' Representative Council, and by representatives of the French, Serbian, and Polish students. A striking incident in the ceremony was the sounding of the "Last Post" by buglers placed out of sight in one of the stone galleries at a corner of the quadrangle; the sound dominated the whole quadrangle from above and was echoed from the surrounding walls.

ROYAL MEDICAL SOCIETY DINNER.

The annual dinner of the Royal Medical Society took place on February 20th, the guest of the evening being Sir Humphry Rolleston, K.C.B., M.D., LL.D., President of the Royal College of Physicians of London. The dinner was held in the Hall of the Royal College of Physicians, and the company numbered about one hundred, including the Principal of the University, the President of the Edinburgh College of

Physicians, the Vice-President of the College of Surgeons, Vice-Admiral Sir John F. E. Green, Lord Murray, Lord Alness, the Deputy Director of Medical Services, the President of the Royal Faculty of Physicians and Surgeons of Glasgow, Professor Robertson, Professor Cushny, Professor Tovey, and Sir Norman Walker. The Chairman, in proposing the health of the guest of the evening, mentioned that 115 years ago the Society had honoured a very distinguished ancestor of his, Sir Humphry Davy. Sir Humphry Rolleston replied, and also proposed the toast of "The Royal Medical Society." In his speech he recalled that the Society was the oldest medical society in the United Kingdom, having been founded in 1734 by six students meeting in a tavern. Of the six original students—George Cleghorn, Cumming, Russel, Hamilton, Archibald Taylor, and James Kennedy—Cleghorn served with the army in Minorca, and subsequently became professor of anatomy at Dublin; and Russel wrote a *Natural History of Aleppo*, and at a later period was chiefly instrumental in starting the Medical Society of London in 1773. These two men were typical of the Scottish character in spreading, like missionaries, all over the empire and world the lessons learnt in Edinburgh. Other toasts proposed were "The Edinburgh Medical School" and "Sister Professions." Dr. Pearce, of the Rockefeller Institute, in replying to the latter, acknowledged the references that had been made to sister societies in America. The Royal Medical Society has recently instituted the new office of honorary president, and has elected Dr. Byrom Bramwell to be the first honorary president.

Development of Leith Hospital.

At the annual meeting of subscribers to Leith Hospital reports regarding the past year's work were submitted and reference was made to the projected building of a new wing as the Leith War Memorial. During the year 1,634 in-patients and 11,548 out-patients had been treated, the present accommodation of the hospital being 100 beds. For the year the ordinary income had been £8,782, and the ordinary expenditure £12,258, but the deficit had been more than covered by a gift of £5,000. The general decrease in hospital costs is shown by the corresponding figures for the previous year, which were £10,730 and £13,474 respectively.

Glasgow Eye Infirmary.

At the annual meeting of contributors to the funds of the Glasgow Eye Infirmary Sir Hector Cameron, who presided, said that it was a matter for gratification that the subscriptions showed no diminution notwithstanding the present financial and economic conditions. There was an excess in expenditure over income of £1,273, as against a credit balance last year of £1,385. A considerable amount of work on the buildings had, however, been carried out during the year, including the installation of a new central heating system at a cost of over £2,000.

Ireland.

The Governor of Northern Ireland.

The Duke of Abercorn, the Governor of Northern Ireland, made his state entry into Belfast on February 26th. Among the outstanding events of the day was the presentation of addresses in the Ulster Hall from various bodies, including Queen's University, Belfast, the Ulster Medical Society, the Royal Victoria Hospital, Belfast, the Order of St. John, and the British Red Cross Society. The Governor has made the following medical and dental appointments to his household:—Honorary Physician: Dr. J. A. Lindsay, F.R.C.P., Professor of Medicine in Queen's University, Belfast. Honorary Surgeon: Mr. Thomas Sinclair, C.B., M.Ch., F.R.C.S., Professor of Surgery, Queen's College, Belfast. Honorary Dental Surgeon: Mr. Herbert Williams, Londonderry, Ex-President of the Irish Branch, British Dental Association.

Irish Public Health.

At a conference arranged by the Irish Nurses' Union held recently in the Mansion House, Dublin, the following resolution was unanimously passed:

> That this meeting calls upon the Government to appoint a Ministry of Health and Public Welfare so that the very urgent needs of the community in regard to health services may be considered.

Miss Louie Bennett, president of the Nurses' Union, in proposing the resolution, said that since the Government had not yet formed a Ministry of Health it was important and urgent that public opinion should be aroused in connexion with the present state of public health in this country. Mr. R. J. P. Mortished gave details of a nursing scheme which might be carried out under the proposed Ministry of Health.

Dr. R. J. Rowlette (medical representative on the Irish Public Health Council) agreed that the health of Ireland had been neglected by those who governed the country in the past, and by creating a Ministry of Fisheries and neglecting to create a Ministry of Health the country had shown that it paid more regard to the welfare of the fish in the seas round the Irish coast than to the health of the people on the soil of Ireland. At present, health administration in Ireland was a generation behind that in any other civilized country in the world. In the twenty-six counties of the Free State there was only one whole-time medical officer of health, whereas in Great Britain every county and every considerable town had its health officer. There was no field of preventive work more fruitful than the medical inspection of schools, but, although such inspection had been the law of the land since 1919, no county had yet put it into force. In many instances the school buildings were themselves a danger to the health of the children. As to housing, one-fourth of the tenement houses of Dublin were in 1914 declared, not merely unfit for human habitation, but incapable of being rendered fit. There had been no improvement since. As regards reform of the Poor Law there had been important changes in the past few years, but they had been incomplete and not without fault. The concentration of all hospital treatment into one centre in each county brought great dangers to the sick, and district hospitals could not be dispensed with. He hoped the nurses would demand a national nursing service, just as the medical profession demanded a national medical service. He thought it better at the commencement to work to educate the public to the need of reform in health matters than to put forward partial and incomplete schemes in detail.

Dr. T. Hennessy, Irish Medical Secretary of the British Medical Association, said the truism that prevention is better than cure was fairly well appreciated in most countries if judged by the measures taken to give it effect. In Ireland, however, it would appear to be even scarcely enunciated.

It is true, he continued, that we have Public Health Acts in Ireland which, though somewhat ancient, would have served in their time useful purposes if efficiently administered. Public Health Acts, like other Acts of Parliament, require money for their administration. Public health measures are, in many instances, very unpopular with the public. They restrict the liberty and movements of people who have the misfortune to contract infectious and contagious diseases. For instance, there are parents who send their children to school for the twofold purpose of (1) having them educated, and (2) securing quietness in the home as the result of their absence. It is on occasions necessary in the interests of public health that school children, either suffering or convalescing from infectious diseases, should be kept at home so that they would not convey their diseases to other children. There are parents, however, who will tell a doctor that this is all nonsense and that their freedom and the freedom of their children should not be restricted for the benefit of other people. One would almost think they owed the children of other parents a grudge. Moreover, the same people, whether they are food producers or food retailers, will neither go to the trouble nor the expense to prevent the foods they offer for sale from becoming the vehicles oftentimes of fatal diseases to the consumers. Indeed they will treat it as an act to be strongly resented on the part of a medical practitioner who prevents them, in the interests of the public health, from disposing to the best advantage of their foodstuffs in the usual way.

Much of this could be prevented, or at least mitigated, even by the existing Public Health Acts in Ireland, only that the late Local Government Board seemed for some reason or another determined, whatever else might clash with the selfishness of certain people, that public health administration should not. In no other way can it be explained why the late Local Government Board never took any steps to have a whole-time county medical officer of health appointed to administer public health in Ireland, as was done in Great Britain. It will be readily understood, from what has been already said, the difficulties under which a medical attendant on a family was, in many instances, called upon to discharge also the duties of a medical officer of health. This was the unenviable position of almost every dispensary doctor in Ireland: he was called upon to discharge the dual duties of medical attendant and medical officer of health. Perhaps with the

view of keeping him inert the Local Government Board considered a salary of £15 to £20 a year quite sufficient. For this princely salary, as stated recently in the press, a dispensary doctor, in his capacity of medical officer of health, is solemnly expected to take care of the public health of some 7,000 human beings, and to prevent the occurrence and spread of typhus fever, diphtheria, and other virulent infectious diseases. If in the discharge of his duties he contracted, with fatal results, one of the deadly diseases the spread of which he was trying to combat, the fate of his widow and children was the workhouse—so far, at any rate, as the State was ready to come to the help of such cases. The obvious remedy was and is to appoint a whole-time county medical officer of health, who would be independent of private practice, and thus in a position to take the necessary steps, without any ill consequence to himself, to protect the health of the public.

Another Public Health Act which could have served very useful purposes is the Inspection of Cowsheds and Dairies. This Act had for its main objects the production of milk, butter, and cheese under good sanitary conditions. For the administration of this Act one official to a union was considered sufficient, and he may be a veterinary surgeon or he may be anybody—and he was invariably "anybody." The area of the district inspected by one official was generally some twenty-five miles in length by as many in breadth. For the work to be done the Local Government Board either approved or directed that a salary of £25 or £30 per annum should be paid. Such a salary would not cover the travelling expenses which would be necessary for an inspection lasting for fourteen days. Needless to say the inspection was of a more or less perfunctory character, and if it were meant to be anything else at the salary allowed, the Local Government Board alone could tell. Intentionally or unintentionally the Local Government Board took very certain measures that the Public Health Acts should be inoperative in Ireland. Apart from the health of the Irish people the Local Government Board did not, during its existence, even appreciate the commercial value of a national reputation for an up-to-date public health in a country like Ireland which exported so much of its food products. The part played by the late Local Government Board in Irish public health leaves very little reason to regret its demise. It must, however, be said that the medical department of the late Local Government Board was in no way responsible for the condition of affairs mentioned. The medical administrators, in late years, especially Sir Edward Coey Bigger, did an immense amount of very important public health work, but they could make no headway as the medical side of the Local Government Board was run as a mere side-show of little or no importance. This is the position of public health and preventive medicine in this country in 1923, which, on the whole, is only a little better than a hundred years ago. The immunity we enjoy to-day from the more virulent infectious diseases is entirely due to the medical practitioner. In his individual capacity he has been trying to do what the State neglected.

Drs. K. Lynn, W. M. Crofton, and J. P. Shanley also spoke in connexion with the means to be adopted for the prevention and treatment of tuberculosis, especially in children.

Correspondence.

EDINBURGH UNIVERSITY WAR MEMORIAL.

SIR,—The solemn ceremony which took place here on February 19th, when Lord Balfour, as Chancellor of the University, unveiled memorial tablets on which the names of nearly one thousand victims of the war are inscribed, is an event that will appeal to Edinburgh graduates all over the world. May I take this means of letting them know that it is still open to them to share in the commemoration? Subscriptions to complete the cost are required and will be welcomed from members of the University who have not yet subscribed. It is the desire of those who are responsible that the cost should be met by many gifts of small sums, so that the scattered sons and daughters of the University may feel that they have a part in this beautiful and appropriate mark of honour to our dead.—I am, etc.,

J. A. EWING,
Principal and Vice-Chancellor.

Edinburgh, Feb. 21st.

NEW REGULATIONS FOR THE D.P.H.

SIR,—The proposed new rules for Diplomas in Public Health which are criticized by the Committee of Management of the Examining Board in England of the Royal Colleges of Physicians and Surgeons have for their object the raising of the academic status of those who desire to enter the public health service as a career. The fact that they make it increasingly difficult for members of the R.A.M.C. and possibly for those who take up medical practice abroad to obtain the diploma is not a sufficient reason for relaxing the stringency of the rules. The D.P.H. is essentially a civilian qualification, and is primarily intended for home practice; it is not a necessary adjunct to the medical equipment of a R.A.M.C. officer, for whom adequate instruction in matters of hygiene is provided in the army curriculum. For those who enter medical service abroad a more appropriate extra qualification is a Diploma in Tropical Medicine, as it is obvious that a course of instruction which is quite applicable to conditions obtaining in the industrial centres and rural districts in the homeland would not necessarily be of equal service under vastly different conditions of colonial life.

It is to be hoped that the General Medical Council will not be influenced by special pleading on behalf of a very limited section of prospective candidates for the D.P.H.—I am, etc.,

JAMES J. PATERSON, M.D.Lond., B.Sc., D.P.H.

Maidenhead, Feb. 24th.

ENDOCRINE ACTIVITY AND FOETAL LIFE.

SIR,—For some time I have been engaged in the investigation of an abortive type of cattle offspring which, besides showing certain features characteristic of achondroplasia in the human species, displays certain abnormalities of the endocrine system which suggest another issue of medical interest—namely, the time at which the ductless glands begin to function.

It is well known that the "chrome-staining tissue" is differentiated long before birth, indicating the probability that the adrenal medulla is potentially, at any rate, functional at an early stage in ontogeny. In medical literature one finds not unfrequent references to foetal cretinism, implying that this is also true of the thyroid. But I am not aware that this view has been tested by critical experimentation. Recently I have been able to compare the action of thyroid from 2-months-old and full-time foetal calves by its specific power (Jensen and others) to induce metamorphosis in the Axolotl form of the Mexican salamander, a variety which in nature permanently retains and breeds in the larval condition. The results were negative in the former and positive in the latter case, showing that the foetal thyroid certainly begins to manufacture its active secretion before birth actually takes place. In view of the paucity of evidence on this question, it is proposed to extend the inquiry by quantitative experiments with thyroid from foetuses at different ages, at the same time testing the activity of post-pituitary extracts from the foetal animal by the extremely facile and delicate response evoked by their action in the frog's skin. (Hogben and Winton, 1922.)

The question of endocrine activity in foetal life is of such importance in connexion with the etiology of developmental disorders that I trust in the meantime to benefit by suggestions from any of your readers who have data, direct or clinical, bearing on the time at which the endocrine organs of the foetus become independently operative.—I am, etc.,

F. A. E. CREW, M.D., D.Sc., F.R.S.E.,
Director.

Animal Breeding Research Department,
The University, Edinburgh, Feb. 20th.

PRIMARY UNION AFTER OPERATION FOR SUPPURATIVE APPENDICITIS.

SIR,—As one who has interested himself in this subject for some time (vide BRITISH MEDICAL JOURNAL, October 28th, 1911, ibid., May 25th, 1912), I am in complete accord with Mr. Robert G. Riddell when, in primary closure of the wound in suppurative appendicitis, he states (BRITISH MEDICAL JOURNAL, 1923, p. 322) that "the tissues of the abdominal wall have not the same capability as the peritoneum of dealing with infective organisms."

In a series of eighty-five cases of acute appendicitis published by me (*Glasgow Medical Journal*, September, 1913)—two and a half years' cases—eighty were closed primarily. Those cases only were included in the list in which (1) the appendix was gangrenous, either in whole or in part, with local or general infection of the peritoneum, and (2) those cases in which there was a localized abscess completely shut off from the general peritoneal cavity, the appendix being the *fons et origo mali* and in varying degree of inflammatory destruction. No case was included in the list which did not come under one or other of these groups. Fifty seven out of the eighty-five cases healed primarily. In twenty-seven there was some

infection of the wound. Seven cases died—in one case death occurred six hours after admission; in every case save one death was due to general peritonitis. No drainage will arrest a streptococcal infection of the peritoneum. Like Mr. Riddell I tried to obtain primary union by protecting the wound against infection from the already infected peritoneum, and agree with him that it is necessary to use some antiseptic to the wound in spite of the damage done to the cells by the chemical. What I found most satisfactory to begin with was iodoform emulsion, 10 per cent., poured into the wound before the peritoneum was opened and again after the peritoneum was closed. This was combined with a stock vaccine of *Bacillus coli* given subcutaneously. For some time, however, I have abandoned this in favour of iodine, 4 per cent. in rectified spirit, applied to the wound in the same manner as was the iodoform emulsion, with excellent results.

I congratulate Mr. Riddell in obtaining seven consecutive cases, with one exception, of primary union following the use of flavine; personally, however, I do not like the employment of an aqueous solution of any antiseptic—Mr. Riddell flushed the wound with a solution of flavine, 1 in 1,000—because I believe that all wounds heal better when kept dry, and the rectified spirit in the iodine is an important factor in this connexion.

I am still of opinion that the vast majority of these cases of suppurative appendicitis can be treated by primary closure of the abdominal wound, provided the focus of infection is removed and the appendix stump effectively closed. No case of appendicitis, however, should be allowed to go to the stage of gangrene, of perforation, or of abscess, but that time is evidently not yet.—I am, etc.,

Bournemouth, Feb. 25th. J. GRANT ANDREW.

HOSPITAL POLICY.

SIR,—The discussion on this policy has been continued under every head except one—namely, the development and improvement of the profession of medicine and surgery. My opinion is that before another twenty-five years the hospitals, as on the Continent and, I believe, in some of our colonies, will become State owned. The devices which are now being tried to raise funds will soon become stale, will cease to appeal to the public, and funds will become exhausted.

If we face the inevitable frankly and at the same time suggest a way out of the present difficulties, we shall get a sympathetic hearing from Government and public. The remedy is to institute a State qualification on a par with a good university degree, and make this the sole right to practise. Inferior qualifications would be automatically abolished, but the professors of these institutions need not starve—they could still continue as teachers.

The State would furnish the necessary buildings and equipment in each locality; the staffs would consist of local men, all State examined and all competent. Each man could pursue a specialty, first as a junior, and after some few years as a full surgeon or physician.

Private practice would not necessarily be debarred. The rich, if they chose, could consult any doctor privately and make adequate arrangements to be treated at home if they wished. The ordinary run of humanity, and especially the middle class, would be in a much better position than they are now. People would be as well treated under such conditions, for the medical profession would not cease to maintain the high standard which it has hitherto held. Why did we, until quite recently, so slavishly bow down to German and Austrian medical opinion? In those countries the hospitals are all State owned.

Collapse of the present system is inevitable; let us, for once at least, anticipate events, and give to the State a workable method of dealing with these problems.—I am, etc.,

Fulham, S.W., Feb. 19th. JOHN FLETCHER.

SIR,—By a careless oversight I omitted from the letter appearing under this heading on page 353 of your last issue the section intended to answer the question: "What about having consultations and treatment provided at the out-patient department of a voluntary hospital for members of a contributory scheme, under which there is a stated or implied return required?"

These persons, being insured, are not objects for charity, and therefore the procedure suggested should be somewhat as follows:

(*a*) All services of a consultative nature should be given by the consultant either at his own address or at the patient's home, in so far as it is possible and consistent with the best interests of the patient. In large towns at clinics organized and controlled by the medical profession the fee should be paid from the contributory fund.

(*b*) The contributor should be free to choose the consultant from a list prepared by the governing body of the British Medical Association covering the area of the scheme, such list being prepared in accordance with paragraph 31 (*d*) of the Memorandum on the Hospital Policy of the Association (SUPPLEMENT, BRITISH MEDICAL JOURNAL, October 7th, 1922, p. 134). The list should not be limited to members of the staffs of hospitals.

(*c*) All consultations should be arranged by the private medical attendant.

(*d*) Treatment at an out-patient department of a hospital should be given only where no other arrangements are practicable; or in case of emergency.

As is well known, the greatest abuse in the past has been through the out-patient departments—abuse of charitable funds and abuse of the charity of doctors. If not carefully watched the powerful influences interesting themselves in the forty to fifty schemes now floated in England will further develop this abuse. There is a popular fallacy that none of the specialized medical services can be obtained apart from a voluntary hospital. It is up to our profession to disabuse the public mind on this point by adopting a scheme under which the majority of such special services can be obtained elsewhere, promptly and in comfort for all concerned.

The premiums adequate for insurance can be well within the capacity of all. If it is kept in the forefront of all negotiations that these persons, having insured, *are no longer objects for charity*, whatever their individual financial position may be, it will become easy, when advising how to secure for them any special service, to turn one's mind in that direction in which one looks when making arrangements for a patient who will pay the fee out of his own pocket. The tendency to look to a hospital as the be-all and end-all is becoming accentuated.

May one venture to urge staffs of hospitals to approve the propositions outlined above and in the previous communication (p. 353), and to refuse to co-operate in any scheme which to all intents and purposes is dependent on the misappropriation of funds subscribed for the indigent poor and on the underselling of their own services, with the consequent deprivation of the means of livelihood of their professional colleagues who are competent to be on the staff for one or other of the special services required under these schemes? Is it not imperative on each one of us to consider seriously the position gradually arising as the result of present-day attempts by the State and by private enterprise to organize and control medicine? Will it be found eventually to be for the good of the people—for the good of medicine?—I am, etc.,

Hove, Feb. 24th. E. ROWLAND FOTHERGILL.

SMALL-POX AND VACCINATION.

SIR,—Dr. M. P. Ravenel (February 24th, p. 351) says that I have misrepresented the attitude of Dr. Herman Biggs towards vaccination. If I have done so I hasten to express my regret. I am glad that I guarded myself to some extent by saying "as I understand." It is satisfactory, however, to find that the main facts of the case upon which I based my argument are not disputed. I did not think that they could be, as I received them direct from a medical officer who had held an important position in the Health Service of New York State at the time the repeal of the compulsory vaccination law came about, and who assured me that he was thoroughly conversant with the circumstances. I made a written note of what he told me at the time.

We now have it, in Dr. Biggs's own words, that it was on account of serious injury to health (eleven deaths from tetanus arising as a sequel to vaccination) that the vaccination law in the State of New York was repealed. Therefore it is difficult to follow Dr. Ravenel when he states, at the end of his letter: "He [Dr. Biggs] did not at that time believe, nor does he now believe, that vaccination in childhood produces any injury to the health of the child." I would suggest that perhaps Dr. Ravenel is himself misrepresenting the views of Dr. Biggs. Of course, Dr. Ravenel may reply that it was not vaccination but the tetanus which followed that was to blame, just as other untoward sequelae are so often explained away as being due not to vaccination but to sepsis. The dangers of most operations can be "explained away" by the same method of reasoning.

However that may be, I think we may assume that Dr. Biggs could not have believed that any very serious results

would follow from the repeal of the compulsory law or he would hardly have consented thereto. That is all the inference I wish to draw.—I am, etc.,

Leicester, Feb. 24th. C. KILLICK MILLARD.

PENAL DISCIPLINE.

SIR,—Since Sir Wemyss Grant-Wilson has come at me (February 17th) with fresh matter, and has now made me responsible for a more gentle instrument of restraint than any known to me, may I briefly remind him that, whether the facts are given to the "general reader" by the Prison Commissioners, or through him, or me, or anyone else, "put in irons" is put in irons. We may possess, in handcuffs, an effective, temporary, life-saving apparatus, but its use will not absolve us from blame, if, by our system, we have first endangered the life which we subsequently save in that way. That is the point in my argument which Sir Wemyss has missed.

No reasonable being is, I think, likely to pass "hasty and unmerited criticism" on officers for doing their duty. Nothing in my book applies to them; therefore I should not consider that "speaking for" them would necessarily be doing them a service. "We"—not "they"—are responsible for the forms in which our penal discipline develops. It is for us, not for them, to realize first what is amiss. As this correspondence is really outside any matters contained in my book, I hope Sir Wemyss will agree with me that it may suitably stop at this point.—I am, etc.,

Zürich, Feb. 21st. MARY GORDON.

THE DESTRUCTION OF HUNTER'S NOTES.

SIR,—I should like to say a word relative to the observation made by Sir John Bland Sutton in his Hunterian oration appearing in the BRITISH MEDICAL JOURNAL (February 17th)—namely, that the transcripts made by William Clift from some of Hunter's notes were afterwards destroyed by Everard Home. Now I remember my grandmother, Home's daughter, very well, and she always declared that her father never destroyed any of Hunter's manuscripts, but that a secretary or steward of Hunter's, having a personal spite against Home, in a fit of jealousy burnt many of Hunter's papers and laid the blame on Home! I remember her speaking of this man with the greatest loathing.—I am, etc.,

Scarborough, Feb. 22nd. BERNARD HALE WOODYATT.

Obituary.

CONSTANCE E. LONG, L.S.A., M.D.BRUX., London.

WE regret to announce that Dr. Constance Ellen Long of London died in New York on February 16th from pneumonia. She was born in Reading, and studied at the London School of Medicine for Women, taking the L.S.A. in 1896 and the degree of M.D.Brux. in the same year. She practised in London, and was formerly clinical assistant at the Royal Free Hospital and the New Hospital for Women, and medical officer to Dr. Barnardo's Home, Hawkhurst. She had held the office of president of the Association of Registered Medical Women, and represented the Medical Women's Federation on the Insurance Acts Committee from 1911 to 1914. Dr. Long was one of the earliest exponents in this country of the school of psychology that derived from Professor Jung of Zürich, and edited a volume entitled *Collected Papers on Analytical Psychology*, which included translations of many of Jung's articles. She wrote several papers on psycho-analysis and allied subjects, and a number of her contributions were published in a book, in 1920, with the title of *The Psychology of Phantasy*. She had been in indifferent health for some time, and had been making a prolonged visit to the United States as the guest of her friend and colleague Dr. Beatrice Hinkle of New York.

Dr. H. CRICHTON MILLER writes: By the death of Dr. Constance Long the profession loses a notable pioneer and a somewhat remarkable figure. She was best known as the first exponent in this country of the analytical views of Jung and the Zürich school. Just ten years ago she brought to England the first restatement of psycho-analysis, which had hitherto been practised only on strictly Freudian lines. As the editor of the English translations of Jung's books, her name soon became widely known. By her original papers, by her lectures, and by her book *The Psychology of Phantasy*, she enhanced this reputation. During her seven years of general practice she not only built up a very valuable connexion, but she established a surgical nursing home that possessed many features well worth perpetuating. In these years she learned to recognize the frequency with which the functional factor enters into common complaints, and this brought her to the study of suggestion. Under the influence of Dr. Lloyd Tuckey she became a successful practitioner of hypnotic suggestion, and in 1912 she contributed to the discussion on insomnia at the Annual Meeting of the British Medical Association. But she remained unsatisfied by suggestive therapeutics, as was bound to be the case with anyone so bent on progress. Thus she came to the analytical phase of her life which was its culmination. Such was the road by which Dr. Long arrived at specialization in the teaching and practice of analytical psychology. Those who knew her will agree that it was not the path of least resistance. She was not one of those for whom the new and the unconventional has a strong attraction. The intellectual interest of psychological work was not a compelling force with her, for she had not a specially critical mind, and its bent was practical rather than speculative. Indeed the analytical work she did was not cheaply achieved, but rather through indomitable and earnest application. Those who admired her most will agree that the driving factors in her make-up were unfailing generosity and sincerity. Nobody could ever imagine that Dr. Long was acting from any ulterior or selfish motive. While she talked and wrote a great deal about that spiritual freedom which analytical treatment is intended to procure, her life showed forth much more evidently a selflessness attained in a much more old-fashioned school. Brought up as she had been in the tradition of middle-class and Nonconformist puritanism, she no doubt had many "complexes" to submit to analytical treatment; but she also had that heroic urge towards the "better-than-what-is" that made her contribution to her day such a notable one. During the twenty-six years of her professional career she found time to take a considerable share in work for the profession. She was President of the Association of Registered Medical Women, and at one time was a member of the Insurance Acts Committee of the British Medical Association. She helped to found the Psycho-Medical Society, and was at the time of her death a member of the committee of the Medical Section of the British Psychological Society. In all these offices her place will no doubt be filled; but her place will not readily be filled in the hearts of many friends and patients who had learned to appreciate her wisdom, her integrity, and her sympathy.

Dr. JAMES YOUNG writes of Dr. Long: By her death the profession loses one who strove always to further the interests of medical science, and who bravely fulfilled the arduous function of pioneer in its most difficult and exacting department—that of medical psychology. She will be mourned by all those, friends and patients alike, who knew her for what she was—a woman of kindly and sympathetic understanding, who maintained an untiring devotion to duty in the teeth of the adversities of ill health and of those incidental to all attempts to broaden the basis of knowledge in any branch of human thought.

WILLIAM PRIOR PURVIS, M.D., M.S., F.R.C.S., Senior Surgeon, Royal South Hants and Southampton Hospital.

MR. W. P. PURVIS, who died at his residence at Southampton on February 13th, was born at Belize, British Honduras, and received his medical education at St. Thomas's Hospital Medical School. He took the diplomas of M.R.C.S.Eng. and L.R.C.P.Lond. in 1891, graduated M.B.Lond. in 1892 with honours in medicine, obstetrics, and forensic medicine, B.S. in 1893, M.D. in 1894, and M.S. in 1896; he also became F.R.C.S.Eng. in 1894. After serving as house-surgeon and house-physician at St. Thomas's Hospital he was appointed house-surgeon to the Royal South Hants and Southampton Hospital, subsequently becoming senior surgeon and surgeon in charge of the ear, nose, and throat department of the institution. He was also consulting surgeon to the Free Eye Hospital, the Fenwick Memorial Cottage Hospital, Lyndhurst, the Lymington Cottage and the Milford-on-Sea Cottage Hospitals. Mr. Purvis served with the Southampton Volunteer Ambulance Corps during the South African war, and on his return he together with Dr. R. E. Lauder, the present M.O.H. for Southampton, received the freedom of the borough of

Southampton in recognition of services. He took a prominent part in the school clinic work, and was well known socially in the district.

Dr. JOHN FREDK. BRISCOE writes:

The death of William Prior Purvis is mourned by the united profession in Southampton. He practised the art of surgery for upwards of twenty years in Southampton, specializing, too, in diseases of the ear and throat. Quick, keen, and accurate in diagnosis, he showed himself to advantage in the operating theatre. Nothing tired him in endeavouring to unravel the vagaries of anomalous cases. He was very exacting in the out-patient department, for his clinic was a model of perfection in its thoroughness. Mr. Purvis was very attentive to his poor patients, giving them the most thoughtful consideration. Formerly he was house-surgeon, and step by step for over twenty years he assisted materially in modelling the Royal South Hants and Southampton Hospital to a high state of efficiency. His patients were always carefully noted and detailed, and this tabulation was also noticeable in the out-patient department. Nay, his out-patient clinic was schemed on the lines of the teaching hospital, to the great advantage of the resident staff. As a warm supporter of the British Medical Association he filled all the important offices of the Southern Branch to its presidency. At the Divisional and other meetings Mr. Purvis introduced important clinical material for debate, and, not least, showed interesting surgical cases. Not only was the town of Southampton favoured by his skill and dexterity in the science and art of surgery, but Mr. Purvis was a good citizen. After the Boer war, in which he served, the freedom of the town was conferred upon him. Likewise Mr. Purvis realized the obligations of Freemasonry, and was past-master of the Southampton Lodge and of the Twelve Brothers. He was a past-president of the Southampton Medical Society and its treasurer, while the Southampton Public Medical Service received his valuable support as its chairman. Whatever he did was accomplished with all his might, and here he excelled in detail. He leaves a wife and four sons, one of whom is at Cambridge, and four daughters. Mr. Purvis was cremated, and his ashes were solemnly taken to the grave in Southampton cemetery on February 19th, followed by the whole profession of the town and neighbourhood; and with his confrères were numerous civil followers from all parts of the district.

PETER CALDWELL SMITH, C.B.E., M.A.GLASG., M.D., C.M., D.P.H.CAMB.,
Lieutenant-Colonel R.A.M.C.(T.).

WE record with great regret the death, on February 21st, of Dr. P. Caldwell Smith, medical officer of health for the metropolitan borough of Wandsworth. While travelling in a tramcar on the previous day he became suddenly unconscious. He was taken to the West London Hospital, where he died without regaining consciousness of cerebral apoplexy. He was due to retire on pension in a short time, and was looking forward to a period of leisure after many strenuous years, not only as a public health officer, but in active service during the war. He had only just returned from two months' leave of absence, which he had spent in Italy, and his anxiety to resume work no doubt hastened his end.

Peter Caldwell Smith was a native of Lancashire, where he was born in 1858, but of Scottish parentage. His father was the late James Smith, LL.D., who for many years was secretary of the Educational Institute of Scotland. Caldwell Smith had a very distinguished career at the Glasgow University, where he graduated M.A. in 1878, M.B., C.M. in 1881, and M.D. in 1884. In 1888 he obtained his D.P.H. at Cambridge. For a short time he was lecturer on hygiene at Anderson College Medical School, Glasgow. In 1893 he took up general practice in Wandsworth, and the following year was elected medical officer of health for the Wandsworth parish of the Wandsworth district board. When the five parishes, each with a separate medical officer of health, which constituted the Wandsworth district were formed into the metropolitan borough of Wandsworth in 1901 he was elected medical officer of health for the new borough. He was a prominent member of the Society of Medical Officers of Health, acting on the council of the society for several years. In 1906 he was president of the metropolitan branch of the society. In his presidential address he referred to the effect during half a century of the metropolitan main drainage on the mortality of the metropolis. He was not a prolific writer, contenting himself with taking part in discussions on public health subjects at the meetings of various societies. He expressed himself clearly and to the point, and was always listened to as one having sound judgement and as a master of his craft. But Caldwell Smith will be held in remembrance, not alone as a distinguished medical officer of health, but as an enthusiastic member of the Territorial Force, which he joined soon after its formation. To him is largely due the success of the London Sanitary Companies. He was Sanitary Officer of the 2nd London Division when war broke out, and after serving abroad for a short time was appointed president of the London district travelling medical board. He was twice mentioned in dispatches and received the well earned honour of C.B.E.

Caldwell Smith will be remembered by his colleagues as one with decided opinions, but ever ready to adjust them to well reasoned argument. He could see the weak point in an opponent's case, but was too kindly disposed to take advantage of it by a smart or ill natured retort. To this trait is largely due the success of his public health administration in Wandsworth. He leaves to mourn their loss a widow a daughter, and two sons.

The death took place on January 29th of Dr. WALTER WILLIAM SINCLAIR of Ipswich. He was the son of the late Mr. T. S. Sinclair-Sparke, a solicitor, of Aberdeen and Banchory, and received his medical education at Aberdeen University, where he graduated M.B., C.M. in 1891. After holding appointments at the Royal London Ophthalmic Hospital and the Birmingham and Midland Eye Hospital he settled in ophthalmic practice at Ipswich. He became a member of the honorary staff of the East Suffolk and Ipswich Hospital in 1896, and took charge of the ophthalmic department until 1920, when he was appointed consulting ophthalmic surgeon. During his time of active hospital duty Dr. Sinclair contributed a number of papers to the ophthalmological journals. He was an enthusiastic musician, and was prominently associated in the foundation of the Ipswich Orchestral Society; he also took an active interest in the Ipswich Amateur Opera Company and in the formation of the East Anglian Association of Musical Societies. He is survived by his widow and three daughters. A colleague writes: Dr. Sinclair established a great reputation as an ophthalmic surgeon in Ipswich and throughout the whole of East Anglia, a reputation which was thoroughly deserved. He was most thorough and conscientious in his examination of every patient and was a very skilful operator. His work at the East Suffolk Hospital did very much to enhance the reputation of that institution and was fully recognized by the Board of Management, who named the recently established ophthalmic wards the "Sinclair" wards to perpetuate his memory. He did much to encourage music in Ipswich. He originated the Ipswich Orchestral Society, and conducted in every concert from 1903 until 1915, when failing health compelled him to relinquish some of his activities. His success as a conductor was universally recognized and his enthusiasm inspired the society to reach the very high standard which it attained. He had a keen sense for literature and a highly cultivated and critical intellect. He was one of the most modest and unassuming of men, of a nature transparently honest and straightforward. He thought ill of no one, and no trouble was too much for him if he could do a service to a fellow creature.

We record with deep regret the death in Grenada, through a motor accident, of Dr. CONRAD J. ARTHUR, of the Grenada Medical Service. Dr. Arthur was the son of Canon Arthur, a native of Barbados, highly esteemed by all classes in Grenada. He took the diplomas of L.R.C.P., L.R.C.S. at Edinburgh in 1910, subsequently obtaining the degree of M.D.Brux. He also spent some time at St. Thomas's before entering the Grenada Medical Service in 1911. In that service he had already made his mark, though a comparatively young man, for the introduction of the intensive treatment of yaws in 1919 was largely due to his zeal and initiative, and he also distinguished himself by his energetic prosecution of the local campaign against venereal disease. An active and able practitioner, a keen sportsman, and a good friend to the poor of the island, he will be missed by many, but by none more than his colleagues in the medical service, in whose interests he worked indefatigably during two years' tenure of office as Honorary Secretary of the Grenada Branch of the British Medical Association. To those who can appreciate the peculiar difficulties of the post during a period of

unceasing and unavailing efforts for reform, his loyal and courageous service to the profession will long stand as an example and encouragement. His loss at the moment, when the central body of the Association is entering upon the critical phase of the negotiations he conducted locally with marked ability and devotion, is an unlooked-for disaster.

The Services.

THE DIRECTOR-GENERAL, A.M.S.

IT is officially announced that Major-General Sir William Boog Leishman, K.C.M.G., C.B., of the Army Medical Staff, has been appointed to succeed Sir John Goodwin, K.C.B., as Director-General of the Army Medical Service, with effect from July 29th next, when the latter will vacate the appointment after five years' tenure. Sir William Leishman was born in Glasgow on November 6th, 1865, the son of the late Professor W. Leishman, and was educated at Westminster and at the University of Glasgow, where he graduated M.B. and C.M. in 1886. He entered the Army Medical Department, as it was then called, as surgeon, on July 27th, 1887, passing fifth into Netley. He became Major R.A.M.C. after twelve years' service, and on April 15th, 1905, was promoted to Brevet Lieutenant-Colonel, in recognition of his services and of the distinction he had obtained in original investigation and research. On December 11th, 1911, he became substantive Lieutenant-Colonel, on October 15th, 1912, Brevet Colonel, Colonel on March 1st, 1915, and Major-General on October 24th, 1918. Three years after obtaining his commission Captain Leishman (as he then was) went to India, where he served for six and a half years. He took part in the Waziristan expedition in 1894–95, and received the medal and clasp. He held the appointment of staff surgeon to Sir George Wolseley at Lahore, and did a considerable amount of work in bacteriology. His researches in connexion with kala-azar are well known. The parasite was first observed in 1900, but Leishman did not publish his discovery until 1903, when the same observation had been made by Lieut.-Colonel Charles Donovan, I.M.S., afterwards Professor of Pathology in the Madras Medical College. On return to England Sir William Leishman was posted to Netley, where he worked at bacteriology in Sir Almroth Wright's laboratory. He was Assistant Professor of Pathology at the Medical Staff College and R.A.M. College from February 1st, 1903, to January 31st, 1910; he was then appointed Professor of Pathology at the R.A.M. College, which post he held until January 31st, 1914. When war broke out he was War Office expert on tropical diseases on the Army Medical Advisory Board. He was sent to France in 1914 as Adviser in Pathology, which post he held until he was brought to England in April, 1918; he was appointed Director of Pathology at the War Office (June 1st, 1919). He was created a knight in 1909, C.B. in 1915, and K.C.M.G. in 1918; he was elected a Fellow of the Royal Society in 1910, and has received honorary degrees from the Universities of Glasgow and McGill. He was President of the Society of Tropical Medicine and Hygiene in 1912, and of the Section of Tropical Medicine at the Annual Meeting of the British Medical Association at Brighton in 1913.

Universities and Colleges.

UNIVERSITY OF OXFORD.

Appointment of Demonstrators.

THE Vice-Chancellor has approved the following appointments of Demonstrators for one year from Michaelmas term, 1922:

Department of Human Anatomy.—M. H. MacKeith, B.M., M.A., W. W. Wagstaffe, B.M., M.A., Beatrice Blackwood, M.A.

Department of Physiology.—H. M. Carleton, M.A., C. G. Douglas, B.Sc., D.M., F.R.S., E. G. T. Liddell, B.M., M.A. (for three years).

Department of Biochemistry.—P. C. Raiment, B.A., M.R.C.S., L.R.C.P., G. L. Peskett, B.A.

UNIVERSITY OF CAMBRIDGE.

THE Council of the Senate recommends the appointment of the Right Hon. Sir T. Clifford Allbutt, K.C.B., M.D., Regius Professor of Physic, to represent the Vice-Chancellor at the octocentenary celebrations of St. Bartholomew's Hospital to be held on June 5th, 6th, and 7th.

Professor F. Gowland Hopkins, Mr. G. E. Wherry, and Dr. L. Cobbett have been appointed members of the M.D. Degree Committee.

UNIVERSITY OF LONDON.

AT the January matriculation examination of the University of London 163 passed in the first division and 862 in the second division; 42 took a supplementary certificate for Latin.

The Graham Legacy Committee has reappointed Dr. V. R. Khanolkar to the Graham Scholarship in Pathology for two years from April 1st next. On this occasion the value of the scholarship is £300 a year. The reappointment was made on the recommendation of the School Committee of University College Hospital Medical School, at which Dr. Khanolkar's researches have been carried on during the past three years.

UNIVERSITY OF BIRMINGHAM.

THE prize medals awarded by the University Clinical Board for the past session, together with the Arthur Foxwell memorial medals for 1921 and 1922, were distributed on February 19th by Principal Grant Robinson. The following were the recipients: Senior Medical Prize (gold medal) and Senior Surgical Prize (gold medal): H. S. Savage. Midwifery Prize (gold medal): P. Quinet. Junior Medical Prize (silver medal): S. H. Cookson. Junior Surgical Prize (silver medal): A. G. Taylor. Arthur Foxwell Memorial Gold Medals (for excellence in Clinical Medicine): 1921, A. S. Cookson; 1922, R. J. Gittins.

Medical News.

A SPECIAL course in tuberculosis will be held at the Brompton Hospital for Consumption during the week beginning March 19th. A preliminary meeting will be held at 11.30 on that day; on other days the course will occupy practically the whole day—from 10.30 to 3 or 4 p.m. It will consist for the most part of demonstrations, and will include a few lectures. Full particulars may be obtained on application to the Secretary of the Hospital.

DR. J. H. SEQUEIRA will give a lecture on "Advances in the Treatment of Skin Disease by Light" on Thursday, March 8th, at 5 p.m., in the Anatomical Theatre of the London Hospital Medical College. The lecture will be open to senior students of the hospital and to post-graduates.

THE Prix de Carthage, a biennial prize founded in 1921 for scientific or historical work, has been awarded to Dr. Nicolle of the Pasteur Institute of Tunis for his investigations of typhus fever, kala-azar, trachoma, and Malta fever.

THE *Times* correspondent in Shanghai announces that the Associated British Chambers of Commerce there have passed a resolution welcoming the British Government's decision to devote the Boxer indemnity to purposes beneficial to Great Britain and China, and urging that the money be expended on the education of Chinese on British lines and the support of British medical work, educational and clinical, in China. The financial claims of Hong Kong University were pressed, and it was recommended that only a limited number of travelling scholarships to Great Britain should be granted.

THE next series of lectures to medical students and practitioners, arranged by the staff of Queen Charlotte's Lying-in Hospital, Marylebone Road, N.W., will be given on Thursdays at 5 p.m., commencing on March 15th, when Dr. C. Hubert Roberts will deal with rupture of the uterus, and terminate on April 19th, when Mr. Leonard Phillips will speak on the scope of Caesarean section.

THE sum of £48,487 was collected by the Hospital Sunday Fund last year as against £50,173 collected in 1921. During forty-nine years the sum collected by the Fund amounts to £1,835,711.

A DINNER to celebrate the twenty-fifth anniversary of the foundation of the Röntgen Society will be held on Thursday, March 15th, at the Hotel Cecil, Strand, London, W.C. Tickets, price 17s. 6d., including wine, may be obtained by members from the honorary treasurer, Mr. Geoffrey Pearce, 33, Newton Street, W.C.2.

A BELGIAN Pediatric Society has been founded at Brussels under the presidency of Professor Péchère, and a congress of the Association of French-speaking Pediatrists will be held at Brussels in September under his chairmanship.

IN connexion with the course on children's diseases arranged by the Fellowship of Medicine at the Children's Clinic, Western General Dispensary, Cosway Street, N.W.1, Sir William Bayliss will deliver a lecture on the use of saline injections in the treatment of disease on Monday next, March 5th, at 5 p.m. Members of the medical profession are invited to attend.

A CHADWICK Public Lecture on the principles and practice of sanitary legislation will be given on Monday, March 12th, at 8 p.m., in the Inner Temple Hall, by Dr. Charles Porter, medical officer of health for the borough of St. Marylebone.

THE Council of the University of Paris had decided to confer the honorary degree of Doctor of Medicine on Professor W. W. Keen of Philadelphia and Professor Golgi of Pavia.

Letters, Notes, and Answers.

As, owing to printing difficulties, the JOURNAL *must be sent to press earlier than hitherto, it is essential that communications intended for the current issue should be received by the first post on Tuesday, and lengthy documents on Monday.*

THE postal address of the BRITISH MEDICAL ASSOCIATION and BRITISH MEDICAL JOURNAL is 429, Strand, London, W.C.2. The telegraphic addresses are:

1. EDITOR of the BRITISH MEDICAL JOURNAL, *Aitiology, Westrand, London;* telephone, 2630, Gerrard.
2. FINANCIAL SECRETARY AND BUSINESS MANAGER (Advertisements, etc.), *Articulate, Westrand, London;* telephone, 2630, Gerrard.
3. MEDICAL SECRETARY, *Mediocra, Westrand, London;* telephone, 2630, Gerrard. The address of the Irish Office of the British Medical Association is 16, South Frederick Street, Dublin (telegrams: *Bacillus, Dublin;* telephone, 4737, Dublin), and of the Scottish Office, 6, Rutland Square, Edinburgh (telegrams: *Associate, Edinburgh;* telephone, 4361, Central).

QUERIES AND ANSWERS.

EXPIRATORY SPASM IN A CHILD.

SIR JAMES DUNDAS-GRANT, in reply to "P." (BRITISH MEDICAL JOURNAL, February 24th, 1923, p. 358), suggests the possibility of the case of "expiratory spasm in a child" being one of infantile masturbation, as in a case referred to him as one of possible laryngeal disease. It was described by him in the BRITISH MEDICAL JOURNAL of April 27th, 1901, p. 1005, in a paper on "Traps and pitfalls in general and special practice," as follows:

> "A curious instance of trap for the specialist was the case of a male child of about ten months old, brought to me on account of attacks of suffocation attributed to some obstruction in the throat. On inquiry I elicited that the attacks were characterized by evidences of intense nervous excitement culminating in a climax, followed by intense depression approaching collapse. This closely answered to the description of the orgasm given in Braun's work on diseases of children under the heading of infantile masturbation (Selbst-Befleckung), that I ventured to diagnose it as such, the father confirming my opinion by the observation that during the attacks there was an obvious priapic condition. I found an elongated and tight prepuce and recommended circumcision, with, as I afterwards heard, the most satisfactory results."

INCOME TAX.

"C. J. H. A." asks: If on April 6th I return "Tom Jones £2" (booked the previous January), must I in the following January pay 10s. income tax, although Tom Jones has paid me nothing or a part only of the £2 due to me?

*** We assume that "C. J. H. A." is making his returns on the basis that his "receipts" are his cash takings, plus the value of his book debts at March 31st, 1922, less the corresponding value at March 31st, 1921. If Tom Jones ultimately pays his £2 the result will be that "C. J. H. A." will pay tax before he receives payment of the debt; this is in accordance with the income tax statutes. To the extent to which the debt is considered irrecoverable it will disappear from the value of book debts outstanding at the end of a future year, and so go to reduce the "receipts" on which some future year's profits will be calculated—for example, suppose in 1922-23 Tom Jones pays nothing, and that the debt of £2 is written off as bad, then the "receipts" will, as a whole, be reduced by £2, because the closing value will be reduced by £2 as compared with the opening value.

LETTERS, NOTES, ETC.

HICCUP.

DR. WILLIAM BRAMWELL (Liverpool) writes: Dr. H. J. Fardon's account (BRITISH MEDICAL JOURNAL, February 3rd, p. 220) of the cure of his hiccup by trying Mr. Money's remedy is, as he says, amusing; but this remedy, though "partaking of the nature of folklore," is, I think, capable of scientific explanation. Dr. Fardon tells us that he lay across the bed on his abdomen and, leaning over the edge with head downwards reaching almost to the floor, "managed to perform the feat of drinking water from the far side of the tumbler." The result being that, in spite of his scepticism, he was immediately cured of his hiccup. I agree with Dr. Fardon that the temporary cessation of breathing necessary to accomplish the performance was not the "item of cure." For an explanation we must look to the phrenic nerve, in this case, rather than to the vagus. The pressure exerted upon the abdominal contents by lying in such a position would in turn press upon the peripheral distribution of the phrenic nerve on the under or peritoneal surface of the diaphragm and, either by mechanical interference with the downward jerk of the muscle, or by direct action on the fine terminals of the nerve, check their impulse and so inhibit the spasm. And if so, pressure in this position would be more effectual than pressure on the trunk of the nerve over the scalenus anticus muscle, a procedure which is not always successful and perhaps not without danger. Pressure, too, on the ensiform cartilage, by relaxing the tension of the central tendon of the diaphragm, and thereby weakening the pull of the muscle on the cartilage, would also aid in inhibiting the spasm. That pressure on the ensiform cartilage could bring about such a result will, I think, be shown by the following note of mine which appeared in the BRITISH MEDICAL JOURNAL of September 25th, 1915, in reply to a query by Dr. J. Numa Rat:

> "In a case of persistent hiccough—a woman of about 35 years, who it appeared had suffered almost incessantly for nearly twelve months—I accidentally discovered that on pressure over the ensiform cartilage with the stethoscope the hiccough instantly ceased, but commenced again the moment the pressure was removed. Judging that the beneficial effect of the pressure was due to relaxation of some undue tension in the central tendon of the diaphragm, I made a pad of lint and bound it tightly on so as to exert firm pressure on the cartilage. The hiccough completely ceased so long as the pad remained in position, but returned whenever it was displaced. The patient wore the pad for two or three months with great benefit, but the hiccough finally returned so that no longer pressure over the cartilage would relieve it, and I lost sight of the case. I have had no opportunity of testing the efficacy of this method in other cases, but it is perhaps worth a trial in Dr. Rat's case if no osseous or other impediment exists in the cartilage."

I judge the primary success in this case was due to an unusually flexible ensiform cartilage yielding to a pressure sufficient to lessen the tension in the central tendon of the diaphragm, and that the ultimate failure was due to tuberculous irritation on the peritoneal surface of the muscle, and that the spasm in the later and more advanced stages of the disease, probably owing to a thickening and therefore less flexible tendon, refused to yield to the pressure on the cartilage.

Years ago a man was brought to Sir Patrick Dun's Hospital, Dublin, who had had incessant hiccup for several days. The hiccup continued during the whole night after his admission, but ceased on the following morning at the moment Professor Finny brought the students round the man's bed. The cure was instant and complete, and so far as I am aware the hiccup did not return. Dr. Finny said a few words about mental impressions in hiccup—surprise, shock, etc. I quote the incident as an example of the kind of case that would have brought great credit to the psychotherapeutist.

DETERMINATION OF SEX.

DR. F. HYDE MABERLY (London) writes: Dr. Reginald Maple's account (February 17th, p. 308) of the production of bull or female calves at will, provides strong confirmation of Dr. Rumley Dawson's theory of sex determination; which exactly parallels Dr. Maple's experience. In each case the ovulations produce alternately males and females.

"T.B."

DR. G. NORMAN MEACHEN (Westcliff-on-Sea) writes: Like Dr. Weatherhead, I have often been struck by the incongruous, not to say ignorant, use of the initials "T.B." to designate alike "tubercle," "tuberculosis," and "tuberculous," even in official documents. In my opinion, the simplest manner of abbreviating *one* word is to utilize the first or the first two of three letters. Thus, "T.O." should be sufficient to mean "Tuberculosis Officer," for the confusion with "Transport Officer" is one that is now hardly likely to arise. Personally, I always add "T.O." to my signature upon official documents—never "T.B.O." Why should not the letter "T." alone be allowed to stand for tuberculosis and all that pertains to it? We have long been accustomed to "T.B." for tubercle bacilli, *never* "T.B.B."! If "B" must come into it at all, which it need not, let us have "Tub." A small committee, composed of representatives of the Royal Colleges and of the Ministries of Health and Pensions, might well be established to discuss the matter and prevent the continued perpetration of a ludicrous error.

A DISCLAIMER.

DR. EDW. JAS. DECK (London, W.) writes: It has been brought to my notice that a paragraph appeared in the 6.30 edition of the *Evening News* mentioning my name at some length in connexion with a method of treatment. I did not authorize or consent in any way to this publication, and it was published entirely without my knowledge.

VACANCIES.

NOTIFICATIONS of offices vacant in universities, medical colleges, and of vacant resident and other appointments at hospitals, will be found at pages 35, 37, 40, and 41 of our advertisement columns, and advertisements as to partnerships, assistantships, and locumtenencies at pages 38 and 39.

A short summary of vacant posts notified in the advertisement columns appears in the *Supplement* at page 75.

SCALE OF CHARGES FOR ADVERTISEMENTS IN THE BRITISH MEDICAL JOURNAL.

	£	s.	d.
Six lines and under	0	9	0
Each additional line	0	1	6
Whole single column (three columns to page)	7	10	0
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Whole page	20	0	0

An average line contains six words.

All remittances by Post Office Orders must be made payable to the British Medical Association at the General Post Office, London. No responsibility will be accepted for any such remittance not so safeguarded.

Advertisements should be delivered, addressed to the Manager, 429, Strand, London, not later than the first post on Tuesday morning preceding publication, and, if not paid for at the time, should be accompanied by a reference.

NOTE.—It is against the rules of the Post Office to receive *poste restante* letters addressed either in initials or numbers.